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GLEANINGS

IN

NATURAL HISTORY.

London: Printed by W. CLOWES, Stamford-street.

GLEANINGS

IN

NATURAL HISTORY;

WITH

LOCAL RECOLLECTIONS.

24

BY

EDWARD JESSE, Esq.,

SURVEYOR OF HIS MAJESTY'S PARKS AND PALACES.

TO WHICH ARE ADDED

MAXIMS AND HINTS FOR AN ANGLER.

——— Not a tree,
A plant, a leaf, a blossom, but contains
A folio volume. We may read, and read,
And read again, but still find something new,
Something to please, and something to instruct,
E'en in the noisome weed.

A NEW EDITION.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
MDCCCXXXII.

118.

BIBLIOTHECA · BODLEIANA ·
DOMINUS ILLUMINATIO MEA

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Mr. White, in his preface to the Natural History of Selborne, observes, 'that if stationary men would pay some attention to 'the districts on which they reside, and 'would publish their thoughts respecting 'the objects that surround them, from such 'materials might be drawn the most complete county histories.'

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This little work has no pretensions whatever to science. Its arrangement may be considered defective, and many of the remarks too minute. The time, however, which has been devoted to it, has afforded me amusement of a harmless, if not instructive kind; and it would give me no small pleasure to be assured that I should have been the instrument of leading others to enjoy equal pleasure with myself in studying the works of Nature.

After this avowal, I can only hope that my book will be received with indulgence. Almost every one now writes something: the *scribimus indocti doctique* was never in greater force:

> '—— Those who cannot write, and those who can,
> 'All rhyme, and scrawl, and scribble to a man.'

Addison says that an author should take all methods to humble himself in the opinion he has of his own performances. I can with great truth declare that I have this impression so strong upon me, that I experience no little dread in sending forth this offspring of my leisure hours.

I will only add, in the two last lines of a stanza which one of our poets, later than Chaucer, offers me—

'Go, little book! and in those lists of Fame
  'Where strive the mightiest, run thy destined race;
'Where deathless bays shall crown the victor's name,
  'Show, unabash'd, if bashfully, thy face:
'Where, should scant deed achieved scant guerdon claim,
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either these or other causes, the parent birds remove their eggs, by means of their long claws, to a place of greater security; and this transportation I have observed to be effected in a very short space of time. By placing a lark's egg, which is rather large in proportion to the size of the bird, in the foot, and then drawing the claws over it, you will perceive that they are of sufficient length to secure the egg firmly, and by this means the bird is enabled to convey its eggs to another place, where she can sit upon and hatch them *.

When one of my mowers first told me that he had observed the fact, I was somewhat disinclined to credit it; but I have since ascertained it beyond a doubt, and now mention it as another strong proof of that order in the economy of Nature, by means of which this affectionate bird is enabled to secure its forthcoming offspring. I call it affectionate, because few birds show a stronger attachment to their young †.

While on the subject of larks, I will mention another curious circumstance respecting them. I have often strained my eyes in watching them while

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* It was observed to me that these long claws of the lark might be intended to answer a double purpose—that of enabling the bird to walk with more ease *on* the grass where it frequently harbours.

† Since this was written, I have had a further opportunity of observing the fact respecting the larks removing their eggs; and a friend informs me that, when he was recently in Scotland, a shepherd mentioned having witnessed the same circumstance.

they sang their beautiful notes on the wing, till I could see them no longer.

> ' Up springs the lark,
> ' Shrill-voiced and loud, the messenger of morn;
> ' Ere yet the shadows fly, he, mounted, sings
> ' Amid the dawning clouds.'

If, in his descent, he hears the voice of his mate, you may observe him fall to the earth apparently like a stone. This, however, does not take place during the period of incubation, or before the young birds have left their nest. At those times I have observed that the lark, in his descent, flies along the surface of the field, and alights at some distance from his nest. It is evident that this foresight is given to it by its benevolent Creator for the better preservation of its young; as, if it alighted at its nest, the spot might easily be watched, and its young fall a prey to some marauding ploughboy.

> ' Pride, like the eagle, builds among the clouds,
> ' But pleasure, lark-like, nests upon the ground.—YOUNG.

I have now done with the lark, but it is a great favourite; and notwithstanding all that poets have said of the nightingale, it is, perhaps, listened to during its aërial flights with more pleasure than any other songster we have.

> ' To hear the lark begin his flight,
> ' And singing, startle the dull night
> ' From his watch-tow'r in the skies,
> ' Till the dappled dawn doth rise;
> ' Then to come in spite of sorrow,
> ' And at my window bid good morrow.'
>
> MILTON'S *L'Allegro.*

> 'By Nature led,
> 'A thousand shifts she tries.'
>
> SOMERVILLE.

ANIMALS which prowl or move about much in the dark, are furnished with projecting hairs or whiskers from the upper lips, which guide them in their passage through runs in hedges or holes. These hairs serve as *feelers,* and are exactly of such a length, that the body of the animal will pass through any opening which these projecting hairs do not touch on either side. They are very sensitive, and if they are ever so slightly touched while the animal sleeps, it is instantly aware of it. Hares very often make their runs or mews between two strong upright sticks in a hedge, which will just allow them to pass through, without being sufficiently large to admit the passage of a dog, should it be in pursuit. This is a very extraordinary instinct, and shows a great foresight of danger. In passing through this passage at night, these *feelers* must be of great service to the animal, who without them would probably run against objects which might injure it. Horses have these strong hairs both on the upper and lower lips, but they are probably designed for another use—that of keeping flies and insects from annoying them by getting into their nostrils while they are grazing.

They are sufficiently close together for that purpose, and, moving as they do, while the horse is feeding, serve to brush away anything offensive. Some animals are not furnished in this way, but then they are provided with something which protects them equally well from a similar annoyance. The elephant, for instance, has a sort of valve placed at the extremity of his proboscis, which he carefully closes when he is not using it, to prevent anything getting up his trunk which might injure him. His eyes are small; but, if they were in proportion to his size, he could not, with his peculiar formation, protect them so readily from injury in countries where insects are very formidable. He is, however, furnished with large pendant ears, which serve him as *flappers* in protecting his head from flies. Indeed there are few, if any animals, which are not provided with sufficient means to guard themselves from injuries from those creatures who may annoy, but do not prey upon them. They have also some instinctive or actual properties, which enable them in some degree to secure themselves against the attacks of stronger animals, who, however, must have food, and generally obtain it only by great exertion or watchfulness. We see this in every gradation in the animal world, and it is a striking instance of that order in nature which serves to keep up a due proportion of each created thing, without suffering any one species to be exterminated as long as they are required for useful purposes. This would be the case if too much facility were afforded to predatory animals of securing the weaker ones whenever they pleased. A lion or a tiger has to wait long in ambush, and to exert much patience and watchfulness, before it can find an opportunity of springing upon its prey. This is the case with the cat, fox, and some other animals, and occurs also amongst amphibia and even insects. What is wanting in swiftness is made up in cunning; so that, in some cases, even a semblance of death is put on for the purpose of securing food more readily.

I have entered into these remarks, because I have always considered the subject worthy of attention. How much would our actual enjoyments and comforts in this world be diminished if any one of the various species of quadrupeds, birds, or insects, which we see about us, were suffered to increase in too great a proportion! We can hardly form a calculation of the greatness of the evil either to ourselves or to the different created objects. At present, however, everything is most beautifully ordered and arranged, and no one species predominates too much over another. Those which are most useful to man multiply in a much greater proportion than others which are noxious. The latter, however, have their appointed use, and are made instruments in the hands of a superintending Deity for good. To a contemplative mind it is often a fearful consideration to reflect on the various modes of existence, and the different bodies wherein it has pleased God to cause life to dwell; many of which are subjected to great sufferings, and especially from one part of the creation preying upon another. What, however, many have brought forward as an argument of the want of mercy and justice in Almighty God, is, on the contrary, a proof of His goodness and benevolence.

The means which Nature takes to secure every race from becoming extinct, is to produce them in superabundance. The only way, therefore, of preventing them from overrunning the earth, is to provide enemies who shall prey upon and keep them within due limits. These different races, unless they were killed by their enemies, would increase beyond the supply of their food, so that the ordinary course of death amongst them would be the most painful one that can be imagined, namely, starvation. The real effect, therefore, of what may appear a disorder and cruelty in Nature, is, in point of fact, a mercy, as the individuals are taken off by a sudden death, in the height of their vigour, instead of being subject to the alternative of the lingering and protracted one which a want of food must have occasioned.

'How admirable, therefore, are the works of God!
'how excellent the operations of his hands!

'I considered plants and animals; four-footed
'beasts, and creeping things;

'In all was manifested infinite wisdom, and an strations of the Creator's wisdom in the composition, order, and harmony, of each of them, however insignificant they may appear to us. We are led to see that the minutest things in nature are appointed to some particular end and purpose, and that the 'Deity is as conspicuous in the structure of a fly's 'wing, as he is in the bright globe of the sun itself.' I cannot give you a much stronger proof of this, than by quoting a passage from Derham's Physico-Theology, a book which will both delight and instruct you. Speaking of the formation of insects, he says, 'It is 'an amazing thing to reflect upon the surprising 'minuteness, art, and curiosity, of the joints, muscles, 'tendons, and nerves, necessary to perform all the 'motions of the legs, the wings, and every other 'part; and all these things concur in minute animals, 'even in the smallest mite and animalculæ; and 'having named these animals, why should I mention 'only one part of their bodies, when we have in that 'little compass a whole and complete body, as exquisitely formed, and (as far as our scrutiny can 'possibly reach) as neatly adorned, as the largest 'animals? Let us consider that there we have eyes, 'a brain, a mouth, a stomach, entrails, and every 'other part of an animal body, as well as legs and 'feet, and that all those parts have each of them their 'necessary apparatus of nerves, of various muscles, 'and every other part that other insects have, and 'that all is covered and guarded with a well-made 'tegument, beset with bristles and adorned with neat 'imbrications, and many other fineries.'

It appears almost impossible that any attentive observer of this exquisite workmanship should not be compelled to acknowledge that it is produced by, and is worthy of, a great, all-powerful, and benevolent Creator, who had some good and wise purpose to answer in everything he did; and surely, when this conviction is once firmly impressed upon your mind, you will find infinite pleasure and gratification in making diligent researches into the works of Nature; convinced as I am that the farther your inquiries are carried, the more cause you will have to be delighted with the study, and to acknowledge that the hand which made all these things must be divine.

Another inducement I would hold out to you for the prosecution of this study, is the pleasure you will derive in your solitary walks and rides, from observing the manners and habits of those birds and insects which may fall in your way. An incurious person passes by them, as it were, with his eyes closed; while an attentive observer, and a lover of Nature, has his time and his thoughts delightfully occupied in the contemplation of every bird which he sees near him, and of every insect which crosses his path. He hopes either to find in each of them something heretofore unnoticed, or to admire the beautiful symmetry and elegance of their external appearance, and their different manners and mode of living. Such observa-

'excellent workmanship that I could not compre-'hend.

'Yet so much was made known unto me, as de-'clared the power and goodness of God; and the 'continued agency of the Great Creator, and Lord 'of all things.

'Wherefore have we eyes to see? and hearts that 'we may know and understand?

'O Lord, make me to contemplate thy glorious 'works: and that which I know not, teach thou me!'

It has been justly remarked that there is nothing done by men worthy of commendation, but God has imprinted some imitation of it even in brutes and insects: we see this in various instances. Beavers are not only an example of great industry, but the manner in which they perform their operations in making their dams or embankments according to existing circumstances, in a way which one would almost have thought mere instinct could not have taught them, proves them to be possessed of a faculty which might be considered as only belonging to man. If we want instances of fidelity, attachment, and sagacity, we have them in the dog; and all that we know of the elephant proves him to be capable of imitating some of the best faculties which are found in rational beings. His trunk serves him instead of a hand, and with that member, added to the great share of sense and docility with which he is endowed, he is capable of performing various actions, which man, in a state of ignorance and barbarism, would not have attempted. If we want to see beautiful architecture, we should watch the operations of the bee and other insects; and the weaver might take a lesson from the web of a spider. The persevering industry of the ant has been held up to us for imitation, not only by Solomon, but by the ancient poets.

> ' Magni formica laboris,
> ' Ore trahit quodcunque potest, atque addit acervo
> ' Quem struit, haud ignara ac non incauta futuri.'

Pope has beautifully expressed these thoughts in his Essay on Man,—

> ' Thus, then, to man the voice of Nature spake—
> ' Go, from the creatures thy instruction take :
> ' Learn from the birds what food the thickets yield;
> ' Learn from the beasts the physic of the field;
> ' Thy arts of building from the bee receive;
> ' Learn of the mole to plough, the worm to weave;
> ' Learn of the little nautilus to sail,
> ' Spread the thin oar, and catch the driving gale.'

> 'Each crawling insect holds a rank
> 'Important in the plan of Him who framed
> 'This scale of beings.'
>
> THOMSON.

My bees are a constant source of amusement to me; and the more I study them, the more I am led to admire their wonderful instinct and sagacity. Few things, however, surprise me more than the power which they possess of communicating what I can only call 'intelligence' to each other. This I observe to be almost invariably the case before they swarm. Some scouts may then be observed to leave the hive, and for some time to hover round a particular bush or branch of a tree, after which they return to the hive. In a little while the new swarm quits it, and settles on the branch which had been previously fixed upon by the scouts. The same power of communication may be observed in the ant. I have often put a small green caterpillar near an ant's-nest; you may see it immediately seized by one of the ants, who, after several ineffectual efforts to drag it to its nest, will quit it, go up to another ant, and they will appear to hold a conversation together by means of their antennæ, after which they will return together to the caterpillar, and, by their united efforts, drag it where they wish to deposit it.

I have also frequently observed two ants meeting on their path across a gravel-walk, one going from, and the other returning to the nest. They will stop, touch each other's antennæ, and appear to hold a conversation; and I could almost fancy that one was communicating to the other the best place for foraging, which Dr. Franklin thought they have the power of doing, from the following circumstance. Upon discovering a number of ants regaling themselves with some treacle in one of his cupboards, he put them to the rout, and then suspended the pot of treacle by a string from the ceiling. He imagined that he had put the whole army to flight, but was surprised to see a single ant quit the pot, climb up the string, cross the ceiling, and regain its nest. In less than half an hour several of its companions sallied forth, traversed the ceiling, and reached the depository, which they constantly revisited until the treacle was consumed.

Huber says, 'that Nature has given to ants a 'language of communication by the contact of their 'antennæ; and that, with these organs, they are 'enabled to render mutual assistance in their labours 'and in their dangers; discover again their route 'when they have lost it, and make each other acquainted with their necessities. We see, then,' he adds, 'that insects which live in society are in possession of a language; and in consequence of enjoying a language in common with us, although of 'an inferior degree, have they not greater importance 'in our eyes, and do they not embellish the very spectacle of the universe?'

What I have said respecting the power of communicating intelligence to each other, possessed by bees and ants, applies also to wasps. If a single wasp discovers a deposit of honey or other food, he will return to his nest and impart the good news to his companions, who will sally forth in great numbers to partake of the fare which has been discovered for them. It is, therefore, I think, sufficiently clear that these insects have what Huber calls an 'antennal language,'—a language, we can have no doubt, that is perfectly suited to them,—adding, we know not how much, to their happiness and enjoyments, and furnishing another proof that there is a God,—almighty, all-wise, and all-good,—who has 'ornamented the universe' with so many objects of delightful contemplation, that we may see him in all his works, and learn, not only to fear him for his power, but to love him for the care which he takes of us, and of all his created beings.

'They also know,
'And *reason*, not contemptibly.'
MILTON.

I BELIEVE that I consider with as much reverence as any one can do, and I hope that I am duly grateful for, the wonderful faculty which it has pleased our infinitely wise and good Creator to bestow upon his favourite creature man, for his guidance—I mean his inestimable gift to us of Reason. At the same time I must confess that I am very far from participating in that pride which seems to have led some philosophers to suppose that they should infringe upon the dignity of our highly-privileged species, by admitting any of the kinds which have been placed below us in the scale of creation, to a share in this endowment. On the contrary, my observations of nature have all tended to lead me to think—and I believe that, in general, those who devote much of their time and attention to studying the habits and manners of animals, will be disposed to the same opinion—that if our race has been pre-eminently distinguished by receiving the full light of reason, some sparks and glimmerings of the same Divine faculty have been vouchsafed by the same forming and almighty hand to our inferior fellow-creatures.

It is no doubt exceedingly difficult, and p
impossible, to define where instinct ends, and
begins, in animals. But that some of them a
dowed with a faculty which does not come und
usual notion of instinct, by whatever other na
may choose to call it, will, I think, hardly allo
dispute. This, as it strikes me, appears in th
great degrees of intelligence which we are a
tomed to recognize as elevating one species of a
above another;—as the *half-reasoning* elephan
instance, and the friend of man, the dog, above
berless others. Now, instinct of one tribe, one w
think, as much as in another, must be full and
fect, and would not admit of our considering
degree of intelligence manifested in one specie
higher or lower than that possessed by ano
Again: much more must we conceive that the pr
instinct of any species will be f[illegible] and there
equally possessed by all indiv[illegible] that spe
How, then, upon the notion [illegible] inct, shal
account for that superiority [illegible] nce, whic
found in one individual [illegible] same spe
and which is familiar [illegible] emplo
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and who, in consequence of his having been tied up on a Sunday morning, to prevent his accompanying me to church, would conceal himself in good time on that day, and I was sure to find him either at the entrance of the church, or, if he could get in, under the place where I usually sat.

A gentleman, a good shot, lent a favourite old pointer to a friend who had not much to accuse himself of in the slaughter of partridges, however much he might have frightened them. After ineffectually firing at some birds which the old pointer had found for him, the dog turned away in apparent disgust, went home, and never could be persuaded to accompany the same person afterwards.

I have been often much delighted with watching the manner in which some of the old bucks in Bushy Park contrive to get the berries from the fine thorn-trees there. They will raise themselves on their hind legs, give a spring, entangle their horns in the lower branches of the tree, give them one or two shakes, which make some of the berries fall, and they will then quietly pick them up.

A fly-catcher (*Muscicapa grisola*) had built its nest in a pear-tree against my garden-wall, and I had once or twice stopped and looked at the bird as she sat on her nest. Coming one morning, and looking for the nest, I could not find it for some time, but at last discovered it completely altered in appearance, the external parts of it being now in some

degree assimilated to its situation. Some of the leaves of the pear-tree also seemed to have been drawn more over the nest, as if for the purpose of concealment.

These instances may serve to show that there is something more than mere instinct, which influences the conduct of some animals, and this is shown by bees and ants.

A large brown slug made its way into a glass hive, where the operations of the bees could be distinctly seen. Having killed the slug, and finding that they were unable to get it out of the hive, they covered it over with the thick resinous substance called propolis, and thus prevented its becoming a nuisance to the colony. Into the same hive one of the common brown-shelled snails also gained admittance. Instead of embedding it in propolis, the bees contented themselves with fixing it to the bottom of the hive by plastering the edge with that substance.

I have now in my possession a regular fortificatien made of propolis, which one of my stocks of bees placed at the entrance of their hive, to enable them the better to protect themselves from the attacks of wasps. By means of this fortification, a few bees could effectually guard the entrance, by lessening the space of admission, which I had neglected to do for them.

Bees show great ingenuity in obviating the incon-

> 'Each crawling insect holds a rank
> 'Important in the plan of Him who framed
> 'This scale of beings.'
>
> THOMSON.

MY bees are a constant source of amusement to me; and the more I study them, the more I am led to admire their wonderful instinct and sagacity. Few things, however, surprise me more than the power which they possess of communicating what I can only call 'intelligence' to each other. This I observe to be almost invariably the case before they swarm. Some scouts may then be observed to leave the hive, and for some time to hover round a particular bush or branch of a tree, after which they return to the hive. In a little while the new swarm quits it, and settles on the branch which had been previously fixed upon by the scouts. The same power of communication may be observed in the ant. I have often put a small green caterpillar near an ant's-nest; you may see it immediately seized by one of the ants, who, after several ineffectual efforts to drag it to its nest, will quit it, go up to another ant, and they will appear to hold a conversation together by means of their antennæ, after which they will return together to the caterpillar, and, by their united efforts, drag it where they wish to deposit it.

I have also frequently observed two ants meeting on their path across a gravel-walk, one going from, and the other returning to the nest. They will stop, touch each other's antennæ, and appear to hold a conversation; and I could almost fancy that one was communicating to the other the best place for foraging, which Dr. Franklin thought they have the power of doing, from the following circumstance. Upon discovering a number of ants regaling themselves with some treacle in one of his cupboards, he put them to the rout, and then suspended the pot of treacle by a string from the ceiling. He imagined that he had put the whole army to flight, but was surprised to see a single ant quit the pot, climb up the string, cross the ceiling, and regain its nest. In less than half an hour several of its companions sallied forth, traversed the ceiling, and reached the depository, which they constantly revisited until the treacle was consumed.

Huber says, 'that Nature has given to ants a 'language of communication by the contact of their 'antennæ; and that, with these organs, they are 'enabled to render mutual assistance in their labours 'and in their dangers; discover again their route 'when they have lost it, and make each other acquainted with their necessities. We see, then,' he adds, 'that insects which live in society are in possession of a language; and in consequence of enjoying a language in common with us, although of

venience they experience from the slipperiness of glass, and certainly beyond what we can conceive that mere instinct would enable them to do. I am in the habit of putting small glass globes on the top of my straw hives, for the purpose of having them filled with honey; and I have invariably found that before the bees commence the construction of combs, they place a great number of spots of wax at regular distances from each other, which serve as so many foot-stools, on the slippery glass, each bee resting on one of these with its middle pair of legs, while the fore-claws were hooked with the hind ones of the next above, thus forming a ladder, by means of which the workers were enabled to reach the top, and begin to make their combs there. I was glad to find this circumstance recorded in Dr. Bevan's very agreeable work on the honey-bee, in which another very striking illustration of the reasoning power of bees is mentioned. Dr. Bevan says that a friend of his, on inspecting his bee-boxes, perceived that a centre comb, burdened with honey, had separated from its attachments, and was leaning against another comb, so as to prevent the passage of the bees between them. This accident excited great activity in the colony, but of what nature could not be ascertained at the time. At the end of a week, the weather being cold and the bees clustered together, it was observed through the window of the box that they had constructed two horizontal pillars between the combs alluded to, and

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The power which bees possess of ventilating their hives and of producing such a temperature as will prevent the wax from melting in hot weather, is, I think, another proof that something more than mere instinct influences their conduct, as, in their natural state, bees are probably not in so confined a space as they are in our common straw hives, or exposed so much to the heat of the sun. In hot weather, a number of bees (the number probably being regulated by the state of the atmosphere) may be observed busily employed at the bottom of the hive, moving their wings with so much rapidity that the motion of them is almost imperceptible. If, while this action is going forward, a lighted candle should be held at an opening on the top of the hive, it will immediately be blown out, a fact which will enable you to form some idea of the current of air produced by these insects from the motion of their wings. I have, however, known instances in extreme hot weather, when all

the labours of the bees to keep the hive in a proper temperature have failed, and a part of the wax has melted. In this case it is dangerous to go near the hive. The bees are in a state of extreme irritation, and though I fancy that mine know me and receive me as a friend, and allow me sometimes to take liberties with them with impunity, yet, at the time referred to, I have suffered from their stings in endeavouring to shelter them more effectually from the heat of the sun.

From the instances which have been given, you will now, perhaps, be inclined to agree with me, that some animals and insects are endowed with a faculty which approaches very near to reason. Dr. Darwin asserts, that if we were better acquainted with the histories of those insects which are formed into societies, as bees, ants, and wasps, we should find that their arts and improvements are not so similar and uniform as they now appear to us, but that they arose in the same manner (from experience and tradition) as the arts of our own species; though their reasoning is from few ideas, busied about fewer objects, and is exerted with less energy. My theory does not, I confess, go quite the length of Dr. Darwin's, as, were this true, there is no knowing to what extent the reasoning powers of the insects referred to would carry them, nor would it be possible to explain why they should have remained in exactly the same state in which we have always known and at present find them. Still it serves to show his opinion, that some insects are possessed of a reasoning faculty; and in maintaining a doctrine which has been exposed to much cavil, it is a satisfaction to gain one additional name to the list of its supporters. Dr. Darwin gives an instance of reason in a wasp which he himself witnessed, and which is, I think, conclusive of the fact of these insects possessing something approaching very near to it. He informs us that walking one day in his garden, he perceived a wasp upon the gravel-walk, with a large fly, nearly as big as itself, which it had caught. Kneeling down, he distinctly saw it cut off the head and abdomen, and then, taking up with its feet the trunk, or middle portion of the body to which the wings remained attached, fly away. But a breeze of wind acting upon the wings of the fly, turned round the wasp with its burden, and impeded its progress. Upon this it alighted again on the gravel-walk, deliberately sawed off first one wing and then the other, and having thus removed the cause of its embarrassment, flew off with its booty. If, as has been asserted, there is no surer test of reason, than when, after having tried one mode of accomplishing a purpose, recourse is had to another more likely to succeed, surely some of the instances which have been given will sufficiently prove the reasoning powers of animals and insects; or, if not quite amounting to reason, it is clear, I think, that they are in possession of a superiority of intellect *, which approaches very near to it.

I have often watched a wasp taken in the web of a spider. The spider seems to be so perfectly aware that the wasp has the power of annoying him with its sting, that he carefully avoids coming in contact with it, but winds threads round and round it, till the wasp can neither escape nor do any injury. When it is dead, the spider feeds upon it.

There is a spider found in Jamaica, which makes its nest in the earth, of grass, moss, &c., and afterwards plasters it over with clay. The inside is lined with a silky membrane, smooth, and of a whitish grey, with a valve of the same. When the spider wants to secure itself in the nest, it fastens this valve with its silky threads, so that a resistance is perceived when the fingers are applied to remove the valve. It is probable that the spider is in dread of

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some enemy, which obliges it to have recourse to this ingenious contrivance for defending itself and preserving its young. In the Bermuda Islands there are spiders found which spin their webs between trees that stand eight or nine yards asunder. This they do by darting their threads in the air, and the wind carries them from one tree to the other. This web, when finished, is sufficiently strong to entangle a bird. The fact of spiders throwing out a thread, in order to facilitate their approach to a neighbouring object, is now perfectly well known.

It is no doubt exceedingly difficult, and perhaps impossible, to define where instinct ends, and reason begins, in animals. But that some of them are endowed with a faculty which does not come under the usual notion of instinct, by whatever other name we may choose to call it, will, I think, hardly allow of a dispute. This, as it strikes me, appears in the different degrees of intelligence which we are accustomed to recognize as elevating one species of animal above another,—as the *half-reasoning* elephant for instance, and the friend of man, the dog, above numberless others. Now, instinct of one tribe, one would think, as much as in another, must be full and perfect, and would not admit of our considering the degree of intelligence manifested in one species as higher or lower than that possessed by another. Again: much more must we conceive that the proper instinct of any species will be fully, and therefore equally, possessed by all individuals of that species. How, then, upon the notion of mere instinct, shall we account for that superiority of intelligence, which is found in one individual, to others of the same species, and which is familiar to those who are employed about, or in any way in the habit of *conversing* with, animals? But the observation which appears to me most decidedly to carry the faculties of animals to something exceeding the measure and character of instinct, is that of the new and ingenious contrivances to which they will often have recourse in month of May, found live young ones in the bodies of several large eels; and, in Prussia, M. de Buggenhausen speaks of an eel having been caught during the hay-harvest which was full of young ones, each of which was so small as not to be thicker than a slender thread. Mr. Taylor, also, in his work on angling, asserts that eels are viviparous, and expresses his belief that no one will venture to say that he ever found anything like roe in them. In proof of which he adds, that, for the purpose of satisfying himself on this head, he had cut open numbers of eels, and found within many of them a small, soft, whitish substance, knotted together very curiously, and which, upon close examination, when separated, he found to consist of perfect young eels, capable of moving, though some of them were no thicker than a fine thread; and upon their being put into water, he saw them swim about.

Wishing to ascertain the accuracy of the facts above-mentioned, by ocular demonstration, I requested the head keeper of Richmond Park, who had been in the habit of taking eels in all seasons of the year, to endeavour to find young ones in the inside of an eel. He assured me that he had often tried to find them, but had never succeeded, though so many were bred in the park ponds. I then went to an intelligent Thames fisherman, of the name of Brown, who resides at Kingston, and requested him to endeavour to procure me an eel with young.

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A gentleman, a good shot, lent a favourite old pointer to a friend who had not much to accuse himself of in the slaughter of partridges, however much he might have frightened them. After ineffectually firing at some birds which the old pointer had found for him, the dog turned away in apparent disgust, went home, and never could be persuaded to accompany the same person afterwards.

I have been often much delighted with watching the manner in which some of the old bucks in Bushy Park contrive to get the berries from the fine thorn-trees there. They will raise themselves on their hind legs, give a spring, entangle their horns in the lower branches of the tree, give them one or two shakes, which make some of the berries fall, and they will then quietly pick them up.

A fly-catcher (*Muscicapa grisola*) had built its nest in a pear-tree against my garden-wall, and I had once or twice stopped and looked at the bird as she sat on her nest. Coming one morning, and looking for the nest, I could not find it for some time, but at last discovered it completely altered in appearance, the external parts of it being now in some

degree assimilated to its situation. Some of the leaves of the pear-tree also seemed to have been drawn more over the nest, as if for the purpose of concealment.

These instances may serve to show that there is something more than mere instinct, which influences the conduct of some animals, and this is shown by bees and ants.

A large brown slug made its way into a glass hive, where the operations of the bees could be distinctly seen. Having killed the slug, and finding that they were unable to get it out of the hive, they covered it over with the thick resinous substance called propolis, and thus prevented its becoming a nuisance to the colony. Into the same hive one of the common brown-shelled snails also gained admittance. Instead of embedding it in propolis, the bees contented themselves with fixing it to the bottom of the hive by plastering the edge with that substance.

I have now in my possession a regular fortificatien made of propolis, which one of my stocks of bees placed at the entrance of their hive, to enable them the better to protect themselves from the attacks of wasps. By means of this fortification, a few bees could effectually guard the entrance, by lessening the space of admission, which I had neglected to do for them.

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venience they experience from the slipperiness of glass, and certainly beyond what we can conceive that mere instinct would enable them to do. I am in the habit of putting small glass globes on the top of my straw hives, for the purpose of having them filled with honey; and I have invariably found that before the bees commence the construction of combs, they place a great number of spots of wax at regular distances from each other, which serve as so many foot-stools, on the slippery glass, each bee resting on one of these with its middle pair of legs, while the fore-claws were hooked with the hind ones of the next above, thus forming a ladder, by means of which the workers were enabled to reach the top, and begin to make their combs there. I was glad to find this circumstance recorded in Dr. Bevan's very agreeable work on the honey-bee, in which another very striking illustration of the reasoning power of bees is mentioned. Dr. Bevan says that a friend of his, on inspecting his bee-boxes, perceived that a centre comb, burdened with honey, had separated from its attachments, and was leaning against another comb, so as to prevent the passage of the bees between them. This accident excited great activity in the colony, but of what nature could not be ascertained at the time. At the end of a week, the weather being cold and the bees clustered together, it was observed through the window of the box that they had constructed two horizontal pillars between the combs alluded to, and

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I was one day feeding the poor elephant (who was so barbarously put to death at Exeter 'Change) with potatoes, which he took out of my hand. One of them, a round one, fell on the floor, just out of the reach of his proboscis. He leaned against his wooden bar, put out his trunk, and could just touch the potato, but could not pick it up. After several ineffectual efforts, he at last *blew* the potato against the opposite wall with sufficient force to make it rebound, and he then, without difficulty, secured it. Now it is quite clear, I think, that instinct never taught the elephant to procure his food in this manner; and it must, therefore, have been reason, or some intellectual faculty, which enabled him to be so good a judge of cause and effect. Indeed, the *reflecting* power of some animals is quite extraordinary. I had a dog who was much attached to me,

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'Those that deny them to breed as other fish do, ask if any
'man ever saw an *eel* to have a spawn or melt.'

IZAAK WALTON.

VERY little is yet known of the natural history of the eel; indeed, the element in which they live almost precludes us from that access to them which is necessary to enable us to observe their habits and economy. The eel is evidently a link between the fish and serpent, but, unlike the former, it can exist a long time out of water, which its nocturnal migrations prove, though probably a certain degree of moisture on the grass is necessary to enable it to do this. That they do wander* from one place to another is evident, as I am assured that they have been found in ponds in Richmond Park, which had been previously cleaned out and mudded, and into which no water could run except from the springs which supplied it†.

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* From the following lines of Oppian, the rambling spirit of eels seems to have been known to the ancients:—

'The wandering eel
'Oft to the neighbouring beach will silent steal.'

† I have been informed, upon the authority of a nobleman well-known for his attachment to field-sports, that, if an eel is found on land, its head is invariably turned towards the *sea*, for which it is always observed to make in the most direct line possible. If this information is correct (and there seems to be no reason to doubt it), it shows that the eel, like the swallow, is pos-

An amazing number of eels are bred in the two large ponds in Richmond Park, which is sufficiently evident from the very great quantity of young ones which migrate from those ponds every year. The late respectable head-keeper of that Park assured me, that, at nearly the same day in the month of May, vast numbers of young eels, about two inches in length, contrived to get through the pen-stock of the upper pond, and then through the channel which led into the lower pond, from whence they got through another pen-stock into a water-course which led them eventually into the River Thames. They migrated in one connected shoal, and in such prodigious numbers, that no guess could be given as to their probable amount.

An annual migration of young eels also takes place in the River Thames in the month of May, and they have generally made their appearance at Kingston, in their way upwards, about the second week in that month; and accident has so determined it, that, for several years together, it was remarked that the 10th of May was the day of what the fishermen call eel-fair; but they have been more irregular in their proceedings since the interruption of the lock at Teddington. These young eels are about two inches in length, and they make their approach in

sessed of a strong migratory instinct. May we not suppose that the swallow, like the eel, performs its migrations in the same undeviating course?

one regular and undeviating column of about five inches in breadth, and as thick together as it is possible for them to be. As the procession generally lasts two or three days, and as they appear to move at the rate of nearly two miles and a half an hour, some idea may be formed of their enormous number.

The line of march is almost universally confined to one bank of the river, and not on both sides at the same time; but, from some instinctive or capricious impulse, they will cross the river, and change the side without any apparent reason for doing so. When the column arrives at the entrance of a tributary stream which empties itself into the river, a certain portion of the column will continue to progress up the tributary stream, and the main phalanx either cross the river to the opposite bank, or will, after a stiff struggle to oppose the force of the tributary branch in its emptying process, cross the mouth of this estuary, and regain its original line of march on the same side of the river. In consequence of the young eels dispersing themselves from time to time, as occasion offers, in the manner above described, the shoal must imperceptibly lessen until the whole have disposed of themselves in different places. I have not yet been able to ascertain at what distance from Kingston the shoal has been seen. The locks at Hampton, Sunbury, &c., must, however, retard their progress upwards.

These young eels are easily taken, and persons who want to stock their ponds with them have only to lower a bucket into the midst of the shoal, which many persons do who reside in the neighbourhood of the river, and a sufficient number is immediately taken to answer their purpose.

There is no doubt but that many of these little animals perish during their progress, but the numbers which are annually taken in our rivers show that a sufficient quantity escape to stock them abundantly.

It is very likely that many eels descend the River Thames, perhaps as far as the Nore, for the purpose of breeding,—a practice contrary to that of some other fish, the salmon for instance, who ascend rivers for the same purpose. This would appear not only from the fact of the large annual shoal of young eels coming up, as above related, but from a circumstance which strengthens my conjecture, and which was communicated to me by one of the Elder Brethren of the Trinity House, a gentleman with whom I have enjoyed many agreeable conversations on natural history and other subjects, and whose society I never quitted without having derived from it increased pleasure and improvement. He informed me that on superintending the laying down of some buoys at some places at the Nore, during a very hot summer, he observed a great number of large eels, which appeared to be dying, on the top of the water; and having occasion to go, soon afterwards, to the mouth of the river which runs into the sea near Harwich, he observed the same thing there, and was then informed that the great and unusual warmth of the water during that hot summer had been the occasion of the death of a great many eels. It is, therefore, I think, pretty clear that these eels (and they are chiefly of a large size) came to the mouth of the river, probably to the muddy and brackish oozes in the estuary of the Thames, at the latter end of the summer, for the purpose of breeding; and it is probable that, when this is effected, and their offspring have arrived at a certain degree of maturity, an instinctive force prevails, and they are propelled, under the influence of this instinct, to start upwards, and to stock the river as they go along.

Before I quit this part of my subject it may be as well to mention, for the benefit of all humane persons, that the most effectual and speedy method of killing an eel is putting it into tepid water.

That the eel is viviparous there can, I think, be but little doubt. In the New Monthly Magazine, for the year 1814, there is an interesting article on the breeding and migration of eels, in which some facts as to their being viviparous are mentioned, such as, added to others which I shall have occasion to relate, will, I think, place that point beyond a doubt. In the article in question it is mentioned that Walter Chetwynd, Esq., even so late in the year as the month of May, found live young ones in the bodies of several large eels; and, in Prussia, M. de Buggenhausen speaks of an eel having been caught during the hay-harvest which was full of young ones, each of which was so small as not to be thicker than a slender thread. Mr. Taylor, also, in his work on angling, asserts that eels are viviparous, and expresses his belief that no one will venture to say that he ever found anything like roe in them. In proof of which he adds, that, for the purpose of satisfying himself on this head, he had cut open numbers of eels, and found within many of them a small, soft, whitish substance, knotted together very curiously, and which, upon close examination, when separated, he found to consist of perfect young eels, capable of moving, though some of them were no thicker than a fine thread; and upon their being put into water, he saw them swim about.

Wishing to ascertain the accuracy of the facts above-mentioned, by ocular demonstration, I requested the head keeper of Richmond Park, who had been in the habit of taking eels in all seasons of the year, to endeavour to find young ones in the inside of an eel. He assured me that he had often tried to find them, but had never succeeded, though so many were bred in the park ponds. I then went to an intelligent Thames fisherman, of the name of Brown, who resides at Kingston, and requested him to endeavour to procure me an eel with young.

He promised to do so, and has since brought me several. Upon dissecting them, there at first appeared no receptacle for young eels, till the gut was opened, when, in each partition of the gut, a considerable quantity of a white gelatinous substance was found, curiously knotted together in the manner mentioned by Mr. Taylor, and which, we afterwards found, consisted of young eels perfectly alive, and capable of moving in the water. They appeared to adhere to the upper part of the gut by the mouth, and it was not very easy to detach that part of the little animal, while the rest of its body was quite unattached. I preserved a knot of them in spirits, and have them now by me. The young eels were of different sizes, some of them little thicker than a thread, and some of them much larger and about two inches long, and perfectly white. In one eel that was brought me, the young appeared of a still larger size, and to have arrived at more maturity, though there were fewer of them. These also adhered to the gut by the mouth, and, except for this circumstance, I should have been inclined to suppose that the young take refuge in the inside of the mother by entering her mouth, in the same way young vipers do, a fact I shall have occasion hereafter to notice. Be that as it may, it is, I think, now sufficiently evident that eels are viviparous, though in what way they are generated we are still ignorant.

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The winter retreat of eels is very curious. They not only get deep into the mud, but in Bushey Park, where the mud in the ponds is not very deep, and what there is is of a sandy nature, the eels make their way under the banks of the ponds, and have been found knotted together in a large mass.

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Since writing the above remarks I have referred to what Sir Humphry Davy says, in his 'Salmonia,' respecting the eel, a part of which I will now quote, as his observations are curious and interesting.—'There are two migrations of eels, one *from*, and the 'other *to* the sea; the first in spring and summer, 'the second in autumn, or early in winter. The first 'of very small eels, which are sometimes not more

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Very large eels are certainly found in rivers, the Thames and Mole for instance, where I have seen them, so that they must either have remained in them, or have returned from the sea, which Sir H. Davy thinks they never do, though I should add, that the circumstances already related of so many large eels being seen dead or dying during a hot summer, near the Nore, would appear to confirm his assertion.

If eels are oviparous, as Sir Humphry Davy thinks they are, would not the ova have been found, especially in the conger,—many of which are taken and brought to our markets, frequently of a very large size? It does not appear, however, that any of the fringes along the air-bladder have ever arrived at such a size and appearance as to have justified any one in the supposition that they were ovaria, though, as has been stated, distinguished naturalists, from the time of Aristotle to the present moment, have been endeavouring to ascertain this fact.

Since the above was written, I have been shown ova in the lamprey, and what appeared to have been melt taken from a conger eel, at a fishmonger's in Bond-street. These specimens were preserved by Mr. Yarrell, of Little Ryder-street, St. James's, who had the kindness to open two eels, sent to him from Scotland, in my presence, and in which the fringes were very perceptible, though they were without any ova. That ingenious and indefatigable naturalist is, however, of opinion that eels are oviparous, though he failed in producing proof that the common eels were so. He has, however, promised to clear up this point, and I shall be delighted if he succeeds. Like many others, I am still sceptical on this subject, and shall be glad to be set right. The fact of the lamprey being oviparous, is not conclusive that the eel is so, it being a cartilaginous fish, and the mouth placed on the under side of the head. In spawning, the lamprey selects a spot about a foot and a half below the surface of the water, and where the stream is rapid, and the ground of sand or gravel. The female makes a hole about two feet deep, working the sand or gravel away with her tail, which its peculiar formation, having a ridge attached to it, may enable her to do the more readily. This sand is carried away by the current as soon as it is loosened, so that the operations of the fish are very perceptible. The formation of the hole, and the deposition of the ova in it, generally takes up about a week, during which time the female is attended, and sometimes assisted, by the male. When the hole is completed, the male and female enter it and deposit the melt and spawn. This operation above detailed was witnessed a few days ago (the beginning of June) from Hampton Court Bridge. The opinion expressed by Sir Everard Home (Phil. Trans., 1815, 266), that these fish are hermaphrodites, would seem therefore to be an erroneous one, though it is with considerable diffidence that I venture to say so.

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The winter retreat of eels is very curious. They not only get deep into the mud, but in Bushey Park, where the mud in the ponds is not very deep, and what there is is of a sandy nature, the eels make their way under the banks of the ponds, and have been found knotted together in a large mass.

Eels vary much in size in different waters. The largest I ever caught was in Richmond Park, and it weighed five pounds, but some are stated to have been caught in Ireland which weighed from fifteen to twenty pounds. Seven pounds is, I believe, no unusual size. The large ones are extremely strong and muscular. Fishing one day at Pain's Hill, near Cobham, in Surrey, I hooked an eel amongst some weeds, but before I could land him, he had so twisted a new strong double wire, to which the hook was fixed, that he broke it and made his escape.

In concluding this notice of the eel, it may be as

well to mention that those which Brown, the fisherman, brought me had no appearance whatever of having young ones within them, as far as I could judge, till we opened them; and this, together with the circumstance of the young being found in the gut, may account for the ignorance in which many persons have so long remained as to that fact. Why the eel should not, like the female viper, with whom it is very conspicuous, show an external appearance of being with young, is a circumstance not at present easy to be accounted for, especially as the young are found in infinitely greater numbers in the eel than they are in the adder. On opening some of the grigs, which are so common in the Thames, those which were supposed to be about two years old had young ones within them, the same as larger eels*.

Since writing the above remarks I have referred to what Sir Humphry Davy says, in his 'Salmonia,' respecting the eel, a part of which I will now quote, as his observations are curious and interesting.—'There are two migrations of eels, one *from*, and the 'other *to* the sea; the first in spring and summer, 'the second in autumn, or early in winter. The first 'of very small eels, which are sometimes not more

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* It may be objected that what we considered to be young eels, in the gut of the old ones, were parasitical worms, such as are found in the intestines of many fish. But the immense quantities we found, and their being able to swim, or rather *wriggle* like young eels, in water, leaves little doubt of their being so.

'than two or two and a half inches long; the second 'of large eels, which sometimes are three or four 'feet long, and weigh from ten to fifteen, or even 'twenty pounds. There is great reason to believe 'that all eels found in fresh water are the results of 'the first migration; they appear in millions in April 'and May, and sometimes continue to rise as late 'even as July and the beginning of August. I 'remember this was the case in Ireland in 1823. It 'had been a cold, backward summer, and when I 'was at Ballyshannon, about the end of July, the 'mouth of the river, which had been in flood all this 'month, under the fall, was blackened by millions 'of little eels, about as long as the finger, which 'were constantly urging their way up the moist 'rocks by the side of the fall. Thousands died, but 'their bodies remaining moist, served as the ladder 'for others to make their way; and I saw them 'ascending even perpendicular stones, making their 'road through wet moss, or adhering to some eels 'that had died in the attempt. Such is the energy 'of these little animals, that they continue to find 'their way, in immense numbers, to Loch Erne. The 'same thing happened at the fall of the Baun, and 'Loch Neah is thus peopled with them: even the 'mighty fall of Schaffhausen does not prevent them 'from making their way to the Lake of Constance, 'where I have seen many very large eels.'

Sir Humphry Davy adds, 'that there are eels in

be a long time together away from them in search of food, so that she cannot herself impart the necessary warmth to her brood by sitting on them as most other birds do, not only lines her nest with a profusion of the softest feathers and down, but makes it almost in the shape of a ball, with a small hole in the side to enter at, so that the young are effectually protected from cold in their snug abode *. The thrush, on the contrary, who can so readily procure worms on a lawn or in a meadow, so that it is not necessary for both the parent-birds to be absent in search of food at the same time, lines its nest with clay or cow-dung.

The nest of the rook, also, which is in an exposed situation, has but little warmth of lining in it, but then the hen seldom leaves her nest, and is fed during the period of incubation by the cock. He also provides food for the young till the hen bird can leave them with safety to assist him in his labours.

I should not omit noticing the nest of the common house-sparrow, which is of a large size, and completely filled with feathers; and, though they have not so many young to provide food for as the long-tailed titmouse, they have a most voracious progeny, it having been calculated that a pair of spar-

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* I have mentioned, in another place, having found the nest of a long-tailed titmouse with a feather placed over the hole of the nest, evidently intended to exclude the cold winds which prevailed very much at the time I discovered it.

rows, during the time they have their young to feed, destroy on an average 3360 caterpillars in a week, besides other insects. It is, therefore, I think evident, that a more than usual degree of warmth is necessary to be provided in the nest of the sparrow to enable the parent birds to leave their young with safety in search of such a prodigious quantity of food for them.

I have dwelt longer than I had intended on this latter part of the present subject, because it appeared new to me; and it has been well remarked, that, 'amongst the many acts of gratitude we owe to 'God, it may be accounted one to study and con'template the perfections and beauties of his works 'of creation; and that every new discovery must 'necessarily raise in us a fresh sense of the great'ness, wisdom, and power of God.'

'The sable tenants of five hundred years,
'That on the high tops of yon aged elms
'Pour their hoarse music on the lonely ear.'—ANON.

IT is impossible not to admire the manners and habits of rooks. Even Virgil seems to have been very fond of them, as he brings them into notice on every occasion. Indeed, in making remarks which appear so trifling that one is tempted to suppress them as unworthy of the attention of a naturalist, it is some pleasure to find that Virgil himself was not only a most attentive observer of Nature, but that he noticed circumstances in the habits of animals which might pass unheeded by most persons. Thus he mentions the well-known fact of birds* expanding and drying their wings in the sun—of ants conveying their eggs from an exposed situation to the safe recesses of their nest,—

Sæpius et lectis penetralibus extulit ova
Angustum formica terens iter;—

of swallows gliding over the surface of a smooth lake; and of the noise rooks make on returning in the evening from feeding,—

Et è pastu decedens agmine magno
Corvorum increpuit densis exercitus alis.

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* Dum virides inter saltus lucosque sonoros
Vere novo exultat, plumasque decora juventus
Explicat ad solem patriisque coloribus ardet.

It is impossible to witness this circumstance without pleasure, or the smooth but yet rapid manner in which they fly round the high trees on which they are going to roost, as if they thought it time to do so, and yet were unwilling to give up the enjoyment of a still, calm summer's evening, as long as they could see to sport and chase each other in the air; sometimes ascending to a considerable height, and at others descending with amazing rapidity, varying their flight in a manner equally amusing and unexpected.

'But cawing rooks, and kites that swim sublime,
'In still repeated rounds,—have charms for me.'

Country people suppose that when rooks return from pasture making a more than usual noise with their wings, and with a quick flight, it is a sign of rain; and that if part of them stay at the rookery, and sport about the trees, making their cawing note in a softer tone than usual, three or four times successively, it is a sign of fine weather.

Rooks appear to have a language amongst themselves, which is understood by the whole community; and a peculiar note from a bird set to watch and to warn them of approaching danger, is quite sufficient to make them take flight, and always in an opposite direction to that from which the danger is apprehended.

'Their danger well the wary plunderers know,
'And place a watch on some conspicuous bough.'

As the rook is a favourite, I am always sorry to see it during a hard frost. Instead of being that active, happy bird which he appears to be in summer, strutting over a meadow, and either flirting with his mate, or feeding one of his young ones who has had strength enough to follow him, and who receives the food with fluttering wings and tremulous note, he is now, on the contrary, a moping, melancholy bird, appearing to avoid his old companions, and to be without sufficient energy even to seek for food, often remaining in one position for a considerable length of time.

There is one trait in the character of the rook which is, I believe, peculiar to that bird, and which does him no little credit;—it is the distress which they exhibit when one of them has been killed or wounded by a gun while they have been feeding in a field or flying over it. Instead of being scared away by the report of the gun, leaving their wounded or dead companion to his fate, they sho thew greatest anxiety and sympathy for him, uttering cries of distress, and plainly proving that they wish to render him assistance, by hovering over him, or sometimes making a dart from the air close up to him, apparently to try and find out the reason why he did not follow them.

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If he is wounded, and can flutter along the ground, the rooks appear to animate him to make fresh exertions by incessant cries, flying a little distance before him, and calling to him to follow them. I have seen one of my labourers pick up a rook so wounded, which he had shot at for the purpose of putting him up as a scare-crow in a field of wheat, and while the poor wounded bird was still fluttering in his hand, I have observed one of his companions make a wheel round in the air, and suddenly dart past him so as almost to touch him, perhaps with a last hope that he might still afford assistance to his unfortunate mate or companion. Even when the dead bird has been hung, *in terrorem*, to a stake in the field, he has been visited by some of his former friends, but, as soon as they found that the case was hopeless, they have generally abandoned that field altogether.

When one considers the instinctive care with which rooks avoid any one carrying a gun, and which is so evident, that I have often heard country-people remark that they can smell gunpowder, one can more justly estimate the force of their love or friendship in thus continuing to hover round a person who has just destroyed one of their companions with an instrument, the dangerous nature of which they seem fully capable of appreciating.

That it is the instrument, and not the man, which they avoid, is evident from their following the heels of the peaceable ploughman along the furrow, sometimes taking short flights after him, and each rook showing some degree of eagerness to be nearest the ploughman, and to have the best chance of being the first to pick up the newly turned up worm, or the grub of the cockchafer, of which they are very fond.

Rooks are not easily induced to forsake the trees on which they have been bred, and which they frequently revisit after the breeding season is over. This is shown in Hampton Court Park, where there is an extensive rookery amongst the fine lime-trees, and where a barbarous and unnecessary custom prevails of shooting the young rooks. As many as a hundred dozen of them have been killed in one season, and yet the rooks build in the avenue, though there is a corresponding avenue close by, in Bushy Park, which they never frequent, notwithstanding the trees are equally high and equally secure. I never hear the guns go off during this annual slaughter without execrating the practice, and pitying the poor rooks, whose melancholy cries may be heard to a great distance, and some of whom may be seen, exhausted by their fruitless exertions, sitting melancholy on a solitary tree waiting till the *sport* is over, that they may return and see whether any of the offspring which they have reared with so much care and anxiety are left to them; or, what is more probable, the call for assistance of their young having ceased, they are aware of their fate, and are sitting in mournful contemplation of their loss. This may appear romantic, but it is nevertheless true; and whoever, like myself, has observed the habits and manners of the rook, and witnessed their attachment to each other and to their young,—and is convinced, as I am, that they have the power of communication by means of a language known to themselves, and are endowed with a knowledge and foresight most extraordinary, will take as much interest in them as I have confessed that I do.

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The Reverend W. Bingley, an amiable naturalist, has observed, ‘that as soon as rooks have finished ‘their nests, and before they lay, the cocks begin to ‘feed the hens, who receive their bounty with a 'fondling, tremulous voice and fluttering wings, and 'all the little blandishments that are expressed by 'the young while in a helpless state, and that this 'gallant deportment of the male is continued through 'the whole season of incubation.'

I must, however, add that my friends the rooks are somewhat given to thieving, and I am afraid that if both the birds left the nest at the same time, some of the other members of the community would soon deprive them of those sticks which they had collected with so much trouble. One of the birds is, therefore, always left to protect their property.

Rooks feed on various kinds of food, as well as worms. They are sad depredators on my cherry trees, attacking them early in the morning, and carrying off great quantities. They will also eat potatoes and pears, taking them away in their beaks. The grub of the cockchafer, however, seems to be their favourite food, and their search for it, especially in old mossy grass fields, may be seen by the little tufts of moss which are pulled up by them and scattered about. Their power of discovering this caterpillar by the scent is very extraordinary. A gentleman once showed me a field which had all the appearance of having been scorched, as if by a burning sun in dry hot weather. The turf peeled from the ground as if it had been cut with a turfing spade, and we then discovered that the roots of the grass had been eaten away by the larvæ of the cockchafer, which were found in countless numbers at various depths in the soil. This field was visited by a great quantity of rooks, though there was no rookery within many miles of the neighbourhood, who turned up and appeared to devour the grubs with great satisfaction.

Rooks are fond of company, the jackdaw and even the starling being allowed to associate with them, and a mutual good understanding seems to exist amongst them. Even the sparrow is sometimes allowed to build its nest under the protection of that of a crow.

Wilson, in his American Ornithology, says that crows have been employed to catch crows by the following stratagem:—A live crow is pinned by the wings down to the ground on his back, by means of two sharp forked sticks. Thus situated, his cries are loud and incessant, particularly if any other crows are within view. These, sweeping down about him, are instantly grappled and held fast by the prostrate prisoner, with the same instinctive impulse that urges a drowning person to grasp at every thing within his reach. The game being disengaged from his clutches, the trap is again ready for another experiment; and by pinning down each captive successively, as soon as taken, in a short time you will probably have a large flock screaming above you, in concert with the outrageous prisoners below *.

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* This method of catching crows is, I believe, practised in some parts of England to catch jays, who make a most violent outcry when pinned to the ground.

The same author mentions an agreeable instance of attachment in a crow. ‘A gentleman, who re-‘sided on the Delaware, a few miles below Easton, ‘had raised (reared) a crow, with whose tricks and ‘society he used frequently to amuse himself. This ‘crow lived long in the family, but at length disap-‘peared, having, as was then supposed, been shot by ‘some vagrant gunner, or destroyed by accident. ‘About eleven months after this, as the gentleman, ‘one morning, in company with several others, was ‘standing on the river shore, a number of crows hap-‘pening to pass by, one of them left the flock, and ‘flying directly towards the company, alighted on the ‘gentleman's shoulder, and began to gabble away ‘with great volubility, as one long absent friend ‘naturally enough does on meeting with another. ‘On recovering from his surprise, the gentleman ‘instantly recognized his old acquaintance, and en-‘deavoured by several civil, but sly manœuvres, to ‘lay hold of him; but the crow, not altogether re-‘lishing quite so much familiarity, having now had ‘a taste of the sweets of liberty, cautiously eluded all ‘his attempts; and suddenly glancing his eye on his ‘distant companions, mounted in the air after them, ‘soon overtook and mingled with them, and was ‘never afterwards seen to return.’

The crow seems to be even more unpopular in America than he is in this country. Mr. Wilson says, that he is there branded as a thief and a plunderer; a kind of black-coated vagabond, who hovers over the fields of the industrious, fattening on their labours, and, by his voracity, often blasting their expectations. Hated as he is by the farmer, watched and persecuted by almost every bearer of a gun, who all triumph in his destruction, had not heaven bestowed on him intelligence and sagacity, far beyond what is common in other birds, there is reason to believe that the whole tribe would long ago have ceased to exist.

Mr. Wilson seems to think that the American and European crows are the same species.

The average number of rooks' nests, during the last four years, in the avenue of Hampton Court Park, has been about 750. Allowing three young birds and a pair of old ones to each nest, the number would amount to 3750. They are very particular that none of their society build away from the usual line of trees. A pair of rooks did so this spring, and when their nest was nearly finished, at least fifty others came and demolished it in a few minutes. Rooks may be seen teaching their young to fly as soon as they leave the nest, advancing a little way before, and calling upon them to follow. These short flights are incessantly repeated, till the young ones have acquired sufficient strength and skill to follow the old birds.

Crows sometimes choose odd places to build in, and where we should hardly have expected to find the nest of a bird of such social habits. Dr. Mitchell says that a few years ago a pair of crows built their nest between the wings of the dragon of Bow Church in London. They remained there till the steeple required repairs. He adds, that the same or another pair have this spring built their nest on the top of a large plane tree in Wood-street, close to Cheapside. Last season a hawk built its nest under the dome of St. Paul's, and a similar occurrence took place about forty years ago. Another of the falcon tribe had its nest, a few years ago, in the top of the steeple of Spitalfields Church.

Colonel Montague mentions an instance of great sagacity in crows. He observed two of them by the sea-shore, busy in removing small fish beyond the flux of the flowing tide, and depositing them just above high-water mark, under the broken rocks, after having satisfied the calls of hunger.

Mr. Hone, in his Every Day Book, has introduced an agreeable anecdote respecting a rookery on some high trees behind the Ecclesiastical Court in Doctors' Commons. 'Some years ago there were several large elm trees in the college garden behind 'the Ecclesiastical Court, in Doctors' Commons, in 'which a number of rooks had taken up their abode, 'forming, in appearance, a sort of *convocation* of 'aërial ecclesiastics. A young gentleman, who 'lodged in an attic, and was their close neighbour, 'frequently entertained himself with thinning this 'covey of black game, by means of a cross-bow. On 'the opposite side lived a curious old civilian, who 'observing from his study that the rooks often 'dropped senseless from their perch, or, as it may 'be said, without using a figure, *hopped the twig,* 'making no sign, nor any sign being made to his 'vision to account for the phenomenon, set his wits 'to work to discover the cause. It was probably 'during a profitless time of peace, and the doctor, 'having plenty of leisure, weighed the matter over 'and over, till he was at length fully satisfied that 'he had made a great ornithological discovery, that 'its promulgation would give wings to his fame, and 'that he was fated by means of these rooks to say—

'Volito vivus per ora virum.

'His goose-quill and foolscap were quickly in requisition, and he actually wrote a treatise, stating circumstantially what he himself had seen, and in 'conclusion, giving it as the settled conviction of his 'mind, that rooks were subject to the *falling sickness!*'

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When one considers the instinctive care with which rooks avoid any one carrying a gun, and which is so evident, that I have often heard country-people remark that they can smell gunpowder, one can more justly estimate the force of their love or friendship in thus continuing to hover round a person who has just destroyed one of their companions with an instrument, the dangerous nature of which they seem fully capable of appreciating.

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Rooks are not easily induced to forsake the trees on which they have been bred, and which they frequently revisit after the breeding season is over. This is shown in Hampton Court Park, where there is an extensive rookery amongst the fine lime-trees, and where a barbarous and unnecessary custom prevails of shooting the young rooks. As many as a hundred dozen of them have been killed in one season, and yet the rooks build in the avenue, though there is a corresponding avenue close by, in Bushy Park, which they never frequent, notwithstanding the trees are equally high and equally secure. I never hear the guns go off during this annual slaughter without execrating the practice, and pitying the poor rooks, whose melancholy cries may be heard to a great distance, and some of whom may be seen, exhausted by their fruitless exertions, sitting melancholy on a solitary tree waiting till the *sport* is over, that they may return and see whether any of the offspring which they have reared with so much care and anxiety are left to them; or, what is more probable, the call for assistance of their young having ceased, they are aware of their fate, and are sitting in mournful contemplation of their loss. This may appear romantic, but it is nevertheless true; and whoever, like myself, has observed the habits and manners of the rook, and witnessed their attachment to each other and to their young,—and is convinced, as I am, that they have the power of communication by means of a language known to themselves, and are endowed with a knowledge and foresight most extraordinary, will take as much interest in them as I have confessed that I do.

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The Reverend W. Bingley, an amiable naturalist, has observed, 'that as soon as rooks have finished 'their nests, and before they lay, the cocks begin to 'feed the hens, who receive their bounty with a

'And you may take notice, that as the *carp* is accounted the
'water-fox for his cunning, so the *roach* is accounted the water-
'sheep for his simplicity or foolishness.'

IZAAK WALTON.

VERY little is known of the habits and economy of fish from the nature of the element in which they live. When I resided in Bushy Park, I caused the sides and bottom of a place to be bricked, through which a stream of very clear water ran, and stocked it with most of the varieties of our English fresh-water fish, supplying them abundantly with food; but though I constantly watched them, and could see all they did at any time of the day, the result of my observations was far from being satisfactory. The perch were the boldest and most familiar of any of the fish, as I found no difficulty in soon getting them to come with eagerness to take a worm out of my hand. The barbel were the shyest, and seemed most impatient of observation, although in the spring, when they could not perceive any one watching them, they would roll about and rub themselves against the brick work, and show considerable playfulness. There were some large stones in my *piscatorium*, round which they would wind their spawn in considerable quantities. The trout appeared to bear their confinement with less philosophy than any of the others, making high leaps against the grating which admitted the water, and seeming at all times out of sorts and out of condition. The chub were also very restless, being continually on the move, but they never could resist a cockchafer when thrown to them. My flounders only moved at night, and the eels always made their escape, but in what way I never could conjecture, except, indeed, they had the power of crawling up the brick work, which was about five feet from top to bottom, and generally two feet above the edge of the water. They certainly could not get through the grating, which was sufficiently close to confine bleak and gudgeons; and some of the eels were of a large size. The carp and tench were soon reconciled to their situation, and ate boiled potatoes in considerable quantities; and the former seemed to have lost their original shyness, eating in my presence without any scruple. The pike, of which I had eight of about five pounds' weight each, kept up their character for voracity. Out of 800 gudgeons, which were brought to me by a Thames fisherman, and which I saw counted into the reservoir, some few of which however died, there were scarcely any to be seen at the end of three weeks, though I should mention that the three large barbel I had, and six good-sized perch, probably partook of them. Indeed the appetite of one of my pike was almost insatiable. One morning I threw to him, one after the other, five roach, each about four inches in length. He swallowed four of them, and kept the fifth in his mouth for about a quarter of an hour, when it also disappeared.

But, of all my fish, the bleak * were the most amusing and playful. Their activity could not be exceeded; and it gave me much pleasure to see them, on a still summer's evening, dart at every little fly that settled on the water near them, appearing always restless, and yet always happy.

That fish have the power of hearing, there can, I think, be no doubt, as I have seen them suddenly move at the report of a gun, though it was impossible for them to see the flash. They also appear to have the sense of smelling, as they will prefer paste and worms that have been prepared by particular perfumes. They have also some curiosity, which I have witnessed by putting some new object into the water, which they have assembled around, and appeared to reconnoitre: carp, especially, would come up to a new fish which was put amongst them.

Roach, and other small fish, are perfectly aware of, and are careful to avoid, those fish which prey upon them. Thus, I have seen large carp swim amongst a shoal of roach without in the least dis-

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* It may be asked how it happened that these bleak were not devoured by the pike? Many of them were so, no doubt, but there was always a sufficient number left to enable me to observe their habits.

turbing them, while, if a pike comes near them, they make off in every direction.

Fish appear, also, to be capable of entertaining affection for each other. I once caught a female pike during the spawning season, and nothing could drive the male away from the spot at which the female disappeared, whom he had followed to the very edge of the water. A person who had kept two small fish together in a glass, gave one of them away; the other refused to eat, and showed evident symptoms of unhappiness till his companion was restored to him.

The boldness of a pike is very extraordinary. I have seen one follow a bait within a foot of the spot where I have been standing; and the head keeper of Richmond Park assured me that he was once washing his hand at the side of a boat in the great pond in that Park, when a pike made a dart at it, and he had but just time to withdraw it. A gentleman (Major Payne) now residing at Weybridge, in Surrey, informed me, that, walking one day by the side of the River Wey, near that town, he saw a large pike in a shallow creek. He immediately pulled off his coat, tucked up his shirt-sleeves, and went into the water to intercept the return of the fish to the river, and to endeavour to throw it upon the bank by getting his hands under it. During this attempt, the pike, finding he could not make his escape, seized one of the arms of the gentleman, and lacerated it so much that the wound is still very visible*.

The digestion of the pike is so rapid, that, in a few hours, not a single bone of a roach which it has swallowed can be discovered. This may account for the fact of a pike, who has gorged himself to the full, holding a small fish in his mouth whilst the digestion of his previously taken prey has been going on, and swallowing it as soon as that process had been effected.

Mr. Fraser, in his 'History of the Salmon,' mentions the same fact with regard to that fish, and says that he has found seven small fish in a grilse of three pounds and a half, and several, particularly herrings, in the body of salmon, and that the digestion was so rapid, that fire or water could not consume them quicker. He remarks, that the salmon, like the woodcock, has but one intestinal canal: this, he says, is tripled in the middle, and covered with a coat of fat, which, in a short time, dissolves every thing eaten by the fish.

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* A friend of mine caught a pike a few minutes after breaking his tackle, and found it in the pike, a part of the gimp hanging out of his mouth. He also caught another, in high condition, with a piece of strong twisted wire projecting from its side. On opening it, a double eel-hook was found at the end of the wire, much corroded. This may account for so few pike being found dead after they have broken away with a gorge-hook in them. An account will be found, in 'Salmonia,' of a pike taking a bait, with a set of hooks, in his mouth, which he had just before broken from a line.

The Rev. John Buchanan, also, in his account of St. Kilda, gives a still stronger instance of the rapidity of digestion. He says that the Solan goose can carry five herrings at a time to his mate or young, which he ejects from his gorget into the nest. And, he adds, that this fowl digests so quickly, that instances have been known in which the bird being shot immediately as he appeared above the surface of the sea, (after having darted at some fish from on high,) the fish was found partly digested in his stomach.

Sir Humphry Davy, in his 'Salmonia,' speaking of the stronger upper jaw and larger projection of bone below the orbit of the eye, in pike and other fishes of prey, supposes that the use of it is to strengthen the fulcrum of the lever on which the lower jaw moves, so as to afford the means of greater strength to the whole muscular apparatus, by means of which the fish seizes its prey. May not, however, the projection of bone below the orbit of the eye be also intended to protect that organ from injury during the violent darts the pike is often obliged to make in order to seize his prey amongst stones, roots of trees, &c.?

The rapid growth of some fish is very extraordinary. I saw three pike taken out of a pond in Staffordshire belonging to the present Sir Jervoise Clark Jervoise, two of which weighed thirty-six pounds each, and the other thirty-five pounds. The pond was fished every seven years, and, supposing that store pike of six or seven pounds weight were left in it, the growth of the pike in question must have been at the rate of at least four pounds a-year.

Salmon, however, grow much faster. It is now ascertained that grilse, or young salmon, of from two and a half to three pounds weight, have been sent to the London markets in the month of May, the spawn from which they come having only been deposited in the preceding October or November, and the ova taking three months of the time to quicken. It has also been ascertained, by experiment, that a grilse, which weighed six pounds in February, after spawning, has, on its return from the sea in September, weighed thirteen pounds; and a salmon-fry of April will in June weigh four pounds, and in August six*.

Fish are very partial to certain places. A gentleman, well known as an old Thames fisherman, has for several years past been in the habit of marking certain fish which he has caught, taking them several miles up the river in the well of his boat, and then turning them loose. He frequently catches them a second and a third time in the same place were they were originally taken. I have known a pike haunt the same spot under a tree during a whole summer, and salmon are supposed to return in all cases to the river where they were bred.

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* See Mr. Alexander Fraser, on the 'Natural History of the Salmon.'

Mr. Fraser, who has been already quoted, says that, in establishing this curious point in natural history, little reliance can be placed on the alleged variety of appearance in salmon found in different rivers. The best authority is some mark actually made on the body of the fish, which proves also its extraordinary rapidity of growth. In February, 1829, Mr. Fraser marked several grilse after spawning by cutting off the fin above the tail. On the 1st of September following he caught one of them, which then weighed thirteen pounds. On the 10th of the same month he caught another weighing fourteen pounds: both were very fine salmon, and charged with spawn. None of these, he says, could weigh above five or six pounds at the time he marked them. They were taken very near the ground where they were marked.

The same experiment, Mr. Fraser adds, has been often made with success. Mr. Mackenzie, of Ardross, tied wire round the tails of some breeders returning to the sea in March, 1824, and about the same time in the next year, in March, 1825, he caught one of the fish thus marked, doubled in size, and the wire nearly out of sight.

In the river Ewe, in Ross-shire, also, some years since, Mr. Mackenzie, tacksman of the river, marked a number of grilses by cutting off a small part of the tail, or of the short, thick fin above it, and afterwards let them go. Towards the end of the same fishing season some of these fish, marked as above, returned to their river and were caught. They were then large salmon, and double the size and weight which they were two or three months before.

In the river Berridale, in Caithness, Mr. Alexander Morrison, in the year 1794, in the month of May, marked five smelts, or salmon-fry, in such a manner that, if ever any of them returned to the river and were caught, no doubt could remain as to their being of the number so marked. Two of these smelts, then become grilses, he caught in six or seven weeks after they had been marked, when they weighed about three pounds and a half each. In April following he caught another of the number, then a salmon, which weighed between seven and eight pounds; and in the month of August he caught a fourth, weighing eight pounds.

In the rivers Eden, Spey, &c., fry have been marked by boring holes through the tail, and the fish have been found, returned from the sea to the same streams, in about three months afterwards, weighing three pounds each. The fact, therefore, of salmon returning to their native rivers after their migration to the sea, seems to be established beyond a doubt.

Mr. Fraser also observes that the attachment of a salmon to his native streams, like that of young pigeons to their first dove-cot, is well known, and the struggles he will undergo, from weirs and waterfalls, to reach it on returning from the sea, are circumstances equally remarkable. It is possible, he suggests, that he may be guided by the particular smell of the river. He does not think they go far from land, nor beyond the deep dells or valleys that are known to be on each side of the spawning ground resorted to by herrings, and where there are at all times numbers of small fish for the food of the salmon. Salmon, he thinks, do not migrate so far from their rivers as horses, sheep, and dogs have been known to find their way home.

Should this supposition be correct, the return of salmon to their native rivers would be a matter of but little difficulty. I am, indeed, much disposed to believe so from what I have observed of the attachment of fish to certain spots. If they were of a restless disposition, and given to seek new places, their destruction, from many causes, would be much more certain than if they confine themselves, as I believe they do, to particular situations.

What has so often been said of herrings, mackerel, and other gregarious fish moving in vast shoals from Shetland to the Orkneys, and of their then dividing and surrounding the islands of Great Britain and Ireland, is, I think, liable to some objections.

During the last month (April) large shoals of mackerel came on the shallows, a few miles from

Brighton, one day, and disappeared the next. This is constantly observed to be the case not only there but in other places, and may perhaps be accounted for in this way. We must consider that there are, probably, as many mountains, and valleys, and plains in the sea as we know there are on land. We are to recollect that those mountains and valleys are covered with weeds of various kinds, which afford food and shelter to an infinite number of fish and marine animals and insects; and we know that all fish come into shallow water for the purpose of depositing their ova, which the influence of the air, not, as has been commonly supposed, of the sun, is required for bringing to maturity. Is it not probable, then, that the shoals of fish which are found on our fishing banks, have left some neighbouring deep, where they had retired for the winter, till they are rendered buoyant by the quantity of roe within them, and are directed by instinct to go and deposit it in the adjacent shallows? If, as is generally supposed, all fish, both great and small, from the whale to the herring, have each their respective haunts and localities, why should we suppose that they quit those haunts to go many hundred miles in search of spawning ground, when that ground is to be found near their winter retreats? It appears more probable that the large shoals of fish which are found are quite unconnected with each other, and that they have all just quitted some neighbouring deep for the nearest shallow, only moving on as the ground is occupied, or till they have paired and the roe is ready to be deposited. This opinion is entertained by many old fishermen, and the circumstance of shoals of fish appearing and disappearing in the course of a day seems to confirm it. Another fact will strengthen this conjecture. An unusually large sort of herring is caught off the coast of Cardigan, and a much smaller one in the contiguous bay of Swansea. If the shoals of herrings which have been supposed, after quitting the neighbourhood of Shetland in June, to proceed to the Orkneys, and then to divide and surround the island of Great Britain and Ireland, and unite off the Land's-end in September, are really those which are taken off our coasts, why should the fish that are found in the bays of Cardigan and Swansea vary so much in size?

It may be objected that the smaller shoals of mackerel and herrings which are found before the larger shoals appear, have but little roe in them, and that, consequently, they do not come in the shallows to deposit it. This very circumstance, I think, strengthens my argument, as it shows the probability of their having had a retreat in the adjoining deeps, from which they most likely have been driven by porpoises and other fish of prey, who feed on them, and to which they return in a short time, till they are more fully charged with spawn.

I am aware that, in stating these suppositions, I am departing from the opinions expressed by persons who have had better opportunities than myself of ascertaining facts respecting the migration of gregarious fish. My speculations on the subject may, however, lead to further inquiry, and will not, I trust, be found wholly without interest.

At the same time I would not be understood as denying the partial migrations of fish. They certainly do take place, but perhaps not to so great an extent as is generally supposed. These partial migrations may be accounted for by a want of food—by reason of the spawning ground being too much occupied—by fright from the various enemies which surround them—by their ova not having arrived at maturity, and by the now pretty well ascertained fact of the proportion of males to females being about two to three, which might, perhaps, induce the latter to migrate in search of the males. That hard roed fish are more numerous than soft is generally acknowledged. The circumstance, also, of the young fry of the herring and mackerel being taken by fishermen on various parts of our coasts, seems, in some degree, to confirm my conjecture, as does the fact of some few of those fish being found at all seasons of the year.

Again: if these migrations take place *from* the North Seas, large shoals of *young* fish must migrate *to* them, and yet I do not find that such shoals have been seen in sufficient numbers to justify the supposition of their having left the various spawning grounds for the purpose of congregating near Shetland, in readiness for the southward migrations of the following year.

Having stated this speculation of my own (for it is nothing more) respecting the migration of fish, I will mention a curious instance of the disappearance of haddocks from the coasts of Northumberland, Durham, and Yorkshire, in the years 1790, 1791, and 1792. This circumstance is mentioned in a letter to the Secretary of the Royal Society, and seems to have excited the attention of the late Sir Joseph Banks.

It appears that, as far back as the memory of the oldest man reached, prodigious quantities of haddocks were caught on the above-mentioned coasts for about three months in the year. In the years in question this supply nearly ceased, and the few that were caught were remarkably large. Various causes were conjectured for this deficiency, one of which was that the shoal of haddocks had met with beds of copperas at the bottom of the sea; and another, that the usual gales of wind had not taken place which were necessary to drive the fish off the Dogger Bank.

The captains of some vessels belonging to North Shields and Sunderland affirmed that, after doubling the North Cape and near Fisher's Island, they fell in with immense quantities of haddocks lying on the surface of the ocean. Most of these fish were dead, and some in a weak and feeble state, and unable to sink in the water. They found them for the space of between twenty and thirty leagues in length, and from three to five leagues in breadth. Some of them were eaten without any person receiving the least injury from them. They were stated to be lying so thick together, that, in the compass of twelve or fifteen yards, a boat load of three to five tons might have been taken up. On opening some of them the *sound* was found to be much inflated, to which cause the great mortality amongst these fish was ascribed, but what occasioned this inflation does not appear.

In the former part of this paper I mentioned the few observations I had been able to make on some fish I kept in a clear stream which ran through my garden. I will now give an account published by Mr. Neill, in the 'Scots' Magazine,' of some sea-fish kept in a small pond into which sea-water could be introduced. This pond was from time to time replenished with fish. The following fishes were in it :—

'1. *Cod.*—They were lively, and caught greedily at shell-fish which were thrown into the pond. 'They kept chiefly, however, in the deep water, 'and, after approaching with a circular sweep, and 'making a snatch at the prey, descended out of 'sight to devour it.

'2. *Haddock.*—These, contrary to expectations, 'were found to be the tamest fishes in the pond. At 'ebb tide they came to the inner margin, and ate 'limpets from the hand of a little boy, the son of a 'keeper. They appeared white, and rather sickly.

'3. *Coalfish.*—Some of these were of a large size, 'exceeding in dimensions the largest cod in the pond. 'They were bold and familiar, floating about slowly 'and majestically, till some food was thrown to them; 'this they seized voraciously, whether it consisted of 'shellfish or ship biscuit. They also would occasion'ally approach the margin, and take their food from 'the keeper's hand.

'4. *Whiting.*—These were scarce in the pond, 'and very shy.

'5. *Pollack.*—This was pretty common, and has 'been found to answer well as a pond fish.

'6. *Salmon.*—This was the wildest and quickest 'in its motions of all the inhabitants. When a 'muscle or limpet, freed from the shell, was 'thrown on the surface of the water, the salmon very 'often darted forward and took the prey from all 'competitors, disappearing with a sudden jerk and 'turn of the body.

'7. Flat fish or flounders, of two sorts, were also 'in the pond, but they naturally kept at the bottom, 'and were not seen.

‘The food given to the fishes consisted chiefly of ‘sand-eels and of shell-fish, particularly limpets and ‘muscles. In the herring-fishery season, herrings ‘were cut in pieces for this purpose.

‘It is remarkable that all the kinds of sea-fish ‘above enumerated seemed to agree very well toge‘ther. No fighting had ever been observed by the ‘keeper, and seldom any chasing of one species by ‘another. None of the fish ever bred.’

Dr. Fleming has remarked, that when a salt-water fish is put into fresh water, its motions speedily become irregular, its respiration appears to be affected, and unless released it soon dies; and that the same consequences follow when a fresh-water fish is suddenly immersed in salt water.

This is not, however, the case with all fish. A cod will not only live, but thrive well in fresh water if properly fed. A respectable fishmonger assured me that he had tried the experiment and succeeded, and offered to send me some live cod in a well-boat for my *piscatorium* in Bushy Park. Fresh-water trout have also been taken in the sea in a healthy state*.

I have observed that when fish have been bruised, or some of their scales rubbed off, a sort of white *mothery* matter forms on the place, which invariably kills them. When this begins to form they seldom move, and if they do, it is by little darts forward. Their heads get lower and lower, as if they were too heavy for their body, and when it touches the ground they turn up and die.

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* It is a curious fact, that in excavating a hill in the neighbourhood of Verona, fish of various descriptions are found in a fossil state. Some of these are fish from different countries, and, what is still more extraordinary, fresh and salt water fish are found in the same mass.

Carp will breed freely in some ponds and not in others. The Bushy Park ponds have a sandy bottom, with a fine stream of water running through them, and yet very few carp are bred in them; while in some of the muddy, stagnant ponds in Sussex, they breed freely and in great quantities. The same observation applies to tench. Great numbers of perch are bred in the Hampton Court and Bushy Park ponds, all of which are well supplied with running water, and with plenty of food, yet they seldom arrive at a large size. In a neighbouring pond, which is only fed with drainage water, I have caught very large perch. The perch in the water in the Regent's Park are very numerous. Those I have taken, however, are almost invariably of one size, from half to three-quarters of a pound. Why they should have arrived at this weight and not go on increasing in size, is a circumstance which it is not easy to account for. I have, however, remarked it to be the case in other ponds.

Barbel grow to a large size in the river Thames. One was caught a short time ago which weighed upwards of ten pounds, and another was caught weighing thirteen pounds within these last few days.

The following Table will show the different degrees of fecundity in several kinds of fish. It was communicated to the Royal Society by Samuel Clark, Esq.

Fish.	Weight.		Weight of Spawn.	Number of Eggs.
	oz.	dr.	grs.	
Carp	25	5	2,571	203,109
Codfish			12,540	3,686,760
Flounders	24	4	2,200	1,357,400
Herring	5	10	480	36,960
Mackerel	18	0	1,223½	546,681
Perch	8	9	765½	28,323
Pike	56	4	5,100½	49,304
Roach	10	6½	361	81,586
Smelt	2	0	149½	38,278
Sole	14	8	542½	100,362
Tench	40	0		383,252
Lobster			1,671	21,699

‘ The inferior kinds, whom forest trees
‘ Protect from heating sunbeams, and the sweep
‘ Of the sharp winds—fair creatures ! to whom heaven
‘ A calm and sinless life, with love, has given.’
WORDSWORTH.

It is impossible to view the cheerfulness and happiness of animals and birds without pleasure. The latter, especially, appear to enjoy themselves during the fine weather in spring and summer with a degree of hilarity which might be almost envied. It is astonishing how much man might do to lessen the misery of those creatures which are either given to him for food, or use, or for adding to his pleasure, if he was so disposed : instead of which, he often exercises a degree of wanton tyranny and cruelty over them which cannot be too much deprecated, and for which, no doubt, he will one day be held accountable. Animals are so capable of showing gratitude and affection to those who have been kind to them, that I never see them subjected to ill treatment without feeling the utmost abhorrence of those who are inflicting it. I know many persons, who, like myself, take a pleasure in seeing all the animals about them appear happy and contented. Cows will show their pleasure at seeing those who have been kind to them, by moving their ears gently, and putting out their wet noses. My old horse rests his head on the gate with great complacency when he sees me coming, expecting to receive an apple or a piece of bread. I should even be sorry to see my poultry and pigs get out of my way with any symptoms of fear.

The following little anecdote will show the gratitude and recollection of the kindness shown to an animal. A young lady in this neighbourhood (who, if she should ever read this anecdote, will not, I hope, object to having had this instance of her humane disposition recorded) brought up a calf, whose mother had died soon after it was born. She made a *pet* of it; but, when it became an heifer, for some reason it was parted with, and she lost sight of it for about two years. At the end of that time, as she was walking with a friend in a lane, she met some cows, when one of them left the herd and came up to her, showing evident symptoms of pleasure in seeing her. She immediately knew and patted her old acquaintance, who, after being satisfied by these marks of her favour that the recognition was mutual, quietly turned away and joined her companions.

An instance of the same grateful recognition occurred in the case of a lion which is at present, or was lately, in the Tower of London. This lion, when very young, became the property of a gentleman. He had treated it kindly, kept it some time with him abroad, and, on his return, brought it over to England, when, not knowing what else to do with it, he sent it to the Tower. Here he became extremely fierce, and was always mentioned by the keeper as an untameable animal. At the end of two or three years the gentleman called at the Tower to visit his old acquaintance, who immediately recognized him, and upon his being admitted into his cage showed the strongest symptoms of pleasure at again seeing his former master. A story, somewhat similar, is mentioned by Mr. Bingley in his 'Animal Biography.'

Various instances have also been related of the affection of dogs for their masters, refusing even to leave their bodies amidst the din and slaughter of battle. These anecdotes ought to operate in favour of the whole animal creation, and where we cannot have an opportunity of befriending, we ought, at least, to abstain from any unnecessary infliction of misery.

'He knew his lord: he knew, and strove to meet;
'In vain he strove to crawl and lick his feet;
'Yet—all he could—his tail, his ears, his eyes,
'Salute his master, and confess his joys.'

The sagacity and recollection of past events, in some animals, is very surprising. A shepherd employed to bring up some mountain-sheep from Westmoreland, took with him a young sheep-dog who had never made the journey before, and, from his assistant being ignorant of the ground, experienced great difficulty in having the flock stopped at the various roads and lanes he passed in their way to the North Cape and near Fisher's Island, they fell in with immense quantities of haddocks lying on the surface of the ocean. Most of these fish were dead, and some in a weak and feeble state, and unable to sink in the water. They found them for the space of between twenty and thirty leagues in length, and from three to five leagues in breadth. Some of them were eaten without any person receiving the least injury from them. They were stated to be lying so thick together, that, in the compass of twelve or fifteen yards, a boat load of three to five tons might have been taken up. On opening some of them the *sound* was found to be much inflated, to which cause the great mortality amongst these fish was ascribed, but what occasioned this inflation does not appear.

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belonging to a gentleman in Stirlingshire, which had reared three broods of ducks in three successive years, became habituated to their taking to the water, and would fly to a large stone in the middle of the pond, and patiently and quietly watch her brood as they swam about it. The fourth year she hatched her own eggs, and finding that her chickens did not take to the water as the ducklings had done, she flew to the stone in the pond, and called them to her with the utmost eagerness. This recollection of the habits of her former charge, though it had taken place a year before, is not a little curious.

——— 'The poor wren,
'The most diminutive of birds, will fight—
'Her young ones in the nest—against the owl.'

I HAVE always great pleasure in seeing the affection which animals have for their offspring, and which sometimes shows itself in an extraordinary and incongruous manner. A hen who has hatched young ducks will follow them in her agony into the water, and will even sacrifice her life to preserve the lives of her chickens. A fox, or rather a vixen, has been known to carry one of her cubs in her mouth, when she has been pursued by hounds; and whoever has seen a dog break into a covey of young partridges will have had one of the strongest proofs which I know of the force of natural affection. An instance of parental attachment in a bird was recently related to me which gave me much pleasure. A gentleman in my neighbourhood had directed one of his waggons to be packed with sundry hampers and boxes, intending to send it to Worthing, where he was going himself. For some reason his going was delayed; and he therefore directed that the waggon should be placed in a shed in his yard, packed as it was, till it should be convenient for him to send it off. While it was in the shed, a pair of robins built their nest among some straw in the waggon, and had hatched their young just before it was sent away. One of the old birds, instead of being frightened away by the motion of the waggon, only left its nest from time to time for the purpose of flying to the nearest hedge for food for its young; and thus alternately affording warmth and nourishment to them, it arrived at Worthing. The affection of this bird having been observed by the waggoner, he took care in unloading not to disturb the robin's nest; and my readers will, I am sure, be glad to hear that the robin and its young ones returned in safety to Walton Heath, being the place from whence they had set out. Whether it was the male or female robin which kept with the waggon I have not been able to ascertain; but most probably the latter, as what will not a mother's love and a mother's tenderness induce her to perform?

The distance the waggon went, in going and returning, could not have been less than one hundred miles.

Fishing the other day in Hampton Court Park, I disturbed a moor-hen who had just hatched, and watched her anxiety and manœuvres to draw away her young. She would go a short distance, utter a cry, return, and seemed to lead the way for her brood to follow. Having driven her away, that I might have a better opportunity of watching her young ones, she never ceased calling to them, and they made towards her, skulking amongst the rushes, till they got to the other side of the pond. They had only just left the shell, and had probably never heard the cry of their mother before.

If you go near the nest of a lapwing, one of the old birds will fly close to you, and try to draw you from their nest. I have seen my dog almost struck by one of the birds as she flew past him; and they seem quite to forget their own danger in the endeavour to preserve their offspring. It is said that when a hind hears the hounds she will allow herself to be hunted, in order to lead them away from her fawns. Every one knows how bold a hen is in defence of her chickens. The following instance of affection in a bitch for her young was communicated to me by a friend of mine, an officer in the 15th hussars. He had a favourite bull-bitch who had puppies, and thinking as they grew older that they were making her too thin and weak, he took them from her and shut them up in a sort of coop in a yard to which he thought she could not have access. She was seen, however, getting over the wall of the yard; and finding that her puppies could not get at her to suck her, she emptied the contents of her stomach into the place where her young were confined, and continued to do this two or three times a day for some time. She had no difficulty in procuring as much food as she wanted, and conveyed it to her puppies in the manner mentioned. I have always considered this as one of the most curious instances I have met with of animal affection, and indeed of almost reason, as instinct alone would not have taught her this method of feeding her offspring.

Those agreeable naturalists, Messrs. Kirby and Spence, are of opinion that insects are capable of feeling quite as much attachment to their offspring as the largest quadrupeds. They assert that they undergo as severe privations in nourishing them, expose themselves to as great risk in defending them, and in the very approach of death exhibit as much anxiety for their preservation. I had an instance of this the other day in the case of a spider, and I watched its whole proceeding with infinite gratification. I found a spider's nest in the under part of the broad leaf of the striped garden-grass. It was covered with a thick sort of silky web or cocoon, with an opening to enable the spider to go in and out. On taking off the covering, which consisted of two different layers, I found a deposit of eggs closely packed together, and the whole collection was about the size of a large pea. Having completely exposed the eggs, I put the spider and a part of the leaf, to which the eggs were attached, under a glass. In turning down the glass, the spider was at the upper part of it, but she no sooner perceived her eggs than she ran to them with the greatest eagerness—covered them as much as she was able with her body, sensible, no doubt, how necessary warmth was for them—and soon began to spin another silky web over them. Nothing seemed capable of disturbing her during this process, and there was no mistaking her affection for, and attention to her eggs. This she showed in another remarkable way. I had placed the portion of striped grass, which was nearly two inches in length and about three-quarters of an inch in breadth (being that part to which the eggs were attached), under a glass upon a marble mantle-piece in my sitting-room. One of the first operations of my poor spider, as I said before, was to cover her eggs with a web. She then proceeded to fix one of her threads to the upper part of the glass which confined her, and carried it to the further end of the piece of grass, and in a short time had succeeded in raising it up and fixing it perpendicularly, working her threads from the sides of the glass to the top and sides of the piece of grass. There was no mistaking her motives in doing this. She not only rendered her precious charge more secure than it would have been had it remained flat on the marble, but she was probably aware that the cold from the marble would chill her eggs, and prevent their arriving at maturity: she therefore raised them from it in the manner I have described. On the evening of the fourth day after I had confined the spider, two of her eggs were hatched. On coming into my room the next morning, neither eggs the neighbourhood of London. Next year the same shepherd, accompanied by the same dog, brought up another flock for the gentleman who had had the former one. On being questioned how he had got on, he said much better than the year before, as his dog now knew the road, and had kept the sheep from going up any of the lanes or turnings which had given the shepherd so much trouble on his former journey. The distance could not have been less than four hundred miles.

A dog never again came near a gentleman of my acquaintance, who had been in the habit of feeding him, because he once offered him an oyster-shell instead of meat.

'Your swine and barn-door foules are lusty animals, but given
'withal to clamorous unseemly noise; but they are dainty feeding.'
Sleek Friar.

Pigs in general are very impatient of cold or wet, and it has often amused me to watch the care they take to guard themselves against the former. They will collect straw in their mouths and carry it under a shed in the yard, and seem to invite their companions, who are not so employed, to assist in the task, and, as the evening draws to a close, all will nestle together, after a previous struggle for the warmest berth, generally lying head to stern, probably from having found out that they are less liable to quarrel while in this position.

Virgil has noticed this propensity of the pig to collect straw for its bed. Enumerating the signs of settled fine weather, he says—

'Non ore solutos
'Immundi meminêre sues jactare maniplos:
'At nebulæ magis ima petunt, campoque recumbunt.'

'Nor sows unclean are mindful to provide
'Their nestling beds of *mouth-collected* straw.'

In hot weather pigs cover themselves with mud, probably for the purpose of freeing themselves from vermin or keeping off flies, as savages in hot climates cover themselves with grease, &c. for the same purpose, and as Bruce states, that the elephant and rhinoceros do for protection against a fly of which they have a great dread, or perhaps it is done by way of cleansing their scrofulous skins. They are perfectly aware of an approaching change in the weather, when they may often be observed leaving a field where they had previously been quietly feeding, and running to their sties at full speed, making a great outcry the whole of the way. If they hear one of their companions in distress, they show not only sympathy for him, but endeavour to assist him to the utmost of their power; and such is the affection of a sow for her young, that it requires some little care to deprive her of one of them.

I take great delight in observing the habits of the animals in my farm-yard. The old gander watches the sitting goose with great care, and will sometimes take his place on her nest. He is always forward to protect the goslings, and hisses at and runs after anything from which he apprehends danger. The cock struts before the hens, and never seems so happy as when he collects them about him to feast upon a grain of corn or an insect which he has found. This gallantry is, I believe, peculiar to our domestic cock, and does him no little credit. He fights to the last extremity with any intruder, and, if he is beaten, appears to consider himself unworthy of the society of his former mates, and mopes in a corner, the very picture of wretchedness.

Hen turkeys are dull and seem less capable of enjoyment than any birds I know. I have watched them stretching out their necks, and stupidly looking for a quarter of an hour together at a small tuft of grass, making short, low cries all the time. On going up to examine what occasioned this unusual movement, I have found a toad or frog concealed in the grass. Curiosity, more than fear, appeared to have attracted the turkies to the spot. They are bad mothers, and frequently trample on their young, appearing to disregard their cries. Unlike the hen, they do not take any trouble in procuring food for their young. Ducks are in a prodigious bustle when they quit their nests for food, and make a great outcry when the drake comes up to greet their arrival again in the poultry-yard. They run into the pond, flap their wings, and then come out, and are very clamorous till food is brought them. The young ducks, as soon as they are hatched, take to the water, and dart after flies with the greatest activity. I am always sorry to see the anxiety and misery of a hen who has hatched ducks, instead of her natural progeny. When they take to the water she is in a perfect agony, running round the brink of the pond, and sometimes flying into it, in hopes of rescuing her brood from the danger she apprehends them to be in. A friend of mine related a remarkable instance of the degree to which this natural apprehension for her brood may be overcome in the hen by the habit of nursing ducks. A hen, belonging to a gentleman in Stirlingshire, which had reared three broods of ducks in three successive years, became habituated to their taking to the water, and would fly to a large stone in the middle of the pond, and patiently and quietly watch her brood as they swam about it. The fourth year she hatched her own eggs, and finding that her chickens did not take to the water as the ducklings had done, she flew to the stone in the pond, and called them to her with the utmost eagerness. This recollection of the habits of her former charge, though it had taken place a year before, is not a little curious.

——— 'The poor wren,
'The most diminutive of birds, will fight—
'Her young ones in the nest—against the owl.'

———

I HAVE always great pleasure in seeing the affection which animals have for their offspring, and which sometimes shows itself in an extraordinary and incongruous manner. A hen who has hatched young ducks will follow them in her agony into the water, and will even sacrifice her life to preserve the lives of her chickens. A fox, or rather a vixen, has been known to carry one of her cubs in her mouth, when she has been pursued by hounds; and whoever has seen a dog break into a covey of young partridges will have had one of the strongest proofs which I know of the force of natural affection. An instance of parental attachment in a bird was recently related to me which gave me much pleasure. A gentleman in my neighbourhood had directed one of his waggons to be packed with sundry hampers and boxes, intending to send it to Worthing, where he was going himself. For some reason his going was delayed; and he therefore directed that the waggon should be placed in a shed in his yard, packed as it was, till it should be convenient for him to send it off. While it was in the shed, a pair of robins built their nest among some straw in the waggon, and had hatched their young just before it was sent away. One of the old birds, instead of being frightened away by the motion of the waggon, only left its nest from time to time for the purpose of flying to the nearest hedge for food for its young; and thus alternately affording warmth and nourishment to them, it arrived at Worthing. The affection of this bird having been observed by the waggoner, he took care in unloading not to disturb the robin's nest; and my readers will, I am sure, be glad to hear that the robin and its young ones returned in safety to Walton Heath, being the place from whence they had set out. Whether it was the male or female robin which kept with the waggon I have not been able to ascertain; but most probably the latter, as what will not a mother's love and a mother's tenderness induce her to perform?

The distance the waggon went, in going and returning, could not have been less than one hundred miles.

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Those who witnessed the altered appearance of the spider were, like myself, convinced that the young had been introduced into the abdomen; and of this circumstance there could be no doubt. The death of the spider soon afterwards prevented further observations.

There is a large breed of spiders which are found very generally in the palace of Hampton-Court. They are called there 'cardinals,' having I suppose been first seen in Cardinal Wolsey's hall. They are full an inch in length, and many of them of the thickness of a finger. Their legs are about two inches long, and their body covered with a thick hair. They feed chiefly on moths, as appears from the wings of that insect being found in great abundance under and amongst their webs. In running across the carpet in an evening, with the shade cast from their large bodies by the light of the lamp or candle, they have been mistaken for mice, and have occasioned no little alarm to some of the more nervous inhabitants of the palace. A doubt has even been raised whether the name of cardinal has not been given to this creature from an ancient supposition that the ghost of Wolsey haunts the place of his former glory under this shape. Be this as it may, the spider is considered as a curiosity, and Hampton-Court is the only place in which I have met with it.

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* Mr. Kirby says, the young of the spider (*aranea saccata*) attach themselves in clusters upon the back, belly, head, and even legs of the mother; and that in this situation, where they present a very singular appearance, she carries them about with her, and feeds them until their first moult. Upon disturbing her thus covered by hundreds of her progeny, it was amusing to see them all leap from her back, and run away in every direction.

The common earwig has generally a brood of young ones about her at this time of the year, and she shows the greatest care and anxiety for their safety. If she is disturbed, nothing can exceed her agitation. She must have some means of collecting her young together after they have been scattered. I have seen them fall to the ground from a height of two or three feet, and reassemble at the same place again. Mr. Kirby says that 'this insect sits upon 'her eggs, and approaches the habits of the hen in 'the care of her family. As soon as the young are 'hatched, they creep like a brood of chickens under 'the belly of the mother, who will sit over them for 'hours together, and shows the greatest agitation 'when she is disturbed.'

The ravages of the *teredo navalis* are so great, that they are able to eat away timbers from a ship's bottom. I have had a specimen of one of these destructive creatures sent me, with a piece of the timber cut out of a southern whaler. This timber is perforated with passages in every direction, some of them as thick as a finger, and here and there lined with a tubular shell, which is very smooth and white, and thicker than the shell of a snail, and flexuous. The animal sent me is about six inches long, though I believe they have been found much larger; the stomach smooth, with a deep longitudinal groove. On each side there are numerous fleshy prickles, each terminated by a hair. The mouth is furnished with two black nippers.

'I will say a few words on winged insects, which, in their origin 'and metamorphoses, offer the most extraordinary known miracles 'perhaps of terrestrial natures.'—SALMONIA.

A LOVER of natural history cannot I think be a bad man, as the very study of it tends to promote a calmness and serenity of mind favourable to the reception of grateful and holy thoughts of the great and good Parent of the universe. He cannot be a cruel man, because he will be unwilling wantonly to destroy even an insect, when he perceives how exquisitely each of them is contrived, and how curiously it is made for the station it is destined to fill in the animal world. Few things have afforded me greater pleasure than watching the wonderful instinct which induces insects to watch over and protect their offspring. An instance of this occurred under my own observation in the case of a sand-wasp. This animal was observed to fly backwards and forwards very frequently from the side of a window to a gravel walk near it. After some time it was perceived that she collected the finest particles of sand from the walk, with which, under a projection of the window, she formed a cell. When the cell was completed she flew to a neighbouring bush, from whence she selected a little green caterpillar, which with some difficulty she contrived to force into the cell. Having next deposited an egg on the caterpillar, she covered over the top of the cell with a sort of paste made of fine sand, sloping it so that no rain could rest upon it. In this manner four different cells were completed. After a lapse of some time the young wasps emancipated themselves and disappeared. There seems no reason to doubt but that the caterpillars which were so curiously introduced into the cells served not only to protect the young brood from too much heat or cold, which they would have been subject to had they merely been deposited at the bottom of an empty cell, but also for food, till they were capable of extricating themselves from their state of confinement.

Another insect also of the *sphex* genus will dig a hole in sandy ground, drag a large spider, or the caterpillar of a *phalæna*, into it—lame it by biting off its legs—and then lay an egg in each hole; so that the larva may suck out the spinning fluid of the animal which the mother has buried, and in that way prepare itself a habitation in which to pass through its metamorphosis *.

The following remarks on insects are selected from Blumenbach's Elements of Natural History, and may interest those who have not had access to his works.

'It has been calculated that the abdomen of the 'female white ant, when about to lay her eggs, is two

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* Blumenbach.

'thousand times larger than previous to impregna'nation. She can lay eighty thousand eggs within 'twenty-four hours. Insects which undergo meta'morphoses are called larvæ, whilst in the state in 'which they escape from the egg. They are mostly 'very small on their first appearance, so that a full'grown caterpillar of the willow-moth, for instance, 'is seventy-two thousand times heavier than when it 'issues from the egg. On the other hand, they 'grow with great rapidity, so that the maggot of the 'meat-fly, at the end of twenty-four hours, is one 'hundred and fifty-five times heavier than at its 'birth.

'The carrion-beetle (*vespillo*) scents from a dis'tance the bodies of small animals, as moles, frogs, '&c., and buries them under ground for the purpose 'of depositing its eggs. Six of them will bury a 'mole a foot deep in less than four hours.

'The eyes of insects are of two kinds: the first are 'large hemispheres, mostly composed of thousands 'of facets, but in some instances of numerous conical 'points, and covered on the inner surface with a layer 'sometimes glittering, sometimes variegated. Those 'of the second kind are simple, small, and vary as 'well in number as position. Eyes of the first kind 'seem calculated for seeing at a distance—of the 'second for looking at near objects. Only a few in'sects can move their eyes.

'The *antennæ* are organs of feeling, which are of 'great importance to insects, on account of their hard, 'insensible covering, and the immobility of their eyes. 'They appear to possess their most acute feeling in 'the antennæ, as man has in the tips of his fingers; 'and as for the most part they live in darkness, sup'ply the want of light by this contrivance.

'The eggs of some insects are covered with a kind 'of varnish, to protect them from the destructive 'influence of rain and other accidents.'

It would however be an endless task if I were to enter into all the wonders of the insect creation. Latreille says 'that the wisdom of the Creator never 'appears to excite our admiration more than in the 'structure of those minute beings which seem to 'conceal themselves from observation; and Almighty 'Power is never more strikingly exhibited than in 'the concentration of organs in such an atom. In 'giving life to this atom, and constructing in di'mensions so minute so many organs susceptible of 'different sensations, my admiration of the Supreme 'Intelligence is much more heightened than by the 'contemplation of the structure of the most gigantic 'animals.'

——— 'The swan, with arched neck
'Between her white wings mantling proudly, rows
'Her state with oary feet.'
MILTON.

LIVING on the banks of the Thames, I have often been pleased with seeing the care taken of the young swans by the parent birds. Where the stream is strong, the old swan will sink herself sufficiently low to bring her back on a level with the water, when the cygnets will get upon it, and in this manner are conveyed to the other side of the river, or into stiller water. Each family of swans on the river has its own district; and if the limits of that district are encroached upon by other swans, a pursuit immediately takes place, and the intruders are driven away. Except in this instance, they appear to live in a state of the most perfect harmony. The male is very attentive to the female, assists in making the nest, and when a sudden rise of the river takes place, joins her with great assiduity in raising the nest sufficiently high to prevent the eggs being chilled by the action of the water, though sometimes its rise is so rapid, that the whole nest is washed away and destroyed.

The following instance of attachment in these birds has recently come under my observation. A pair of swans had been inseparable companions for three years, during which time they had reared three broods of cygnets: last autumn the male was killed, and since that time the female has separated herself from all society with her own species; and though at the time I am writing (the end of March) the breeding season for swans is far advanced, she remains in the same state of seclusion, resisting the addresses of a male swan who has been making advances towards forming an acquaintance with her, either driving him away, or flying from him whenever he comes near her. How long she will continue in her present state of widowhood I know not, but at present it is quite evident that she has not forgotten her former partner.

This puts me in mind of a circumstance which lately happened at Chalk Farm, near Hampton. A man, set to watch a field of peas which had been much preyed upon by pigeons, shot an old cock pigeon who had long been an inhabitant of the farm. His mate, around whom he had for many a year cooed, and nourished from his own crop, and assisted in rearing numerous young ones, immediately settled on the ground by his side, and showed her grief in the most expressive manner. The labourer took up the dead bird and tied it to a short stake, thinking that it would frighten away the other depredators. In this situation, however, his partner did not forsake him, but continued, day after day, walking slowly round the stick. The kind-hearted wife of the bailiff of the farm at last heard of the circumstance, and immediately went to afford what relief she could to the poor bird. She told me that, on arriving at the spot, she found the hen bird much exhausted, and that she had made a circular beaten track round the dead pigeon, making now and then a little spring towards him. On the removal of the dead bird, the hen returned to the dove-cot.

> 'Like to a pair of loving turtle-doves,
> 'That could not live asunder day or night.'
>
> SHAKSPEARE.

The only instance I have met with in which the hen bird has not the chief care in hatching and bringing up the young is in the case of the emus at the farm belonging to the Zoological Society near Kingston. A pair of these birds have now five young ones: the female at different times dropped nine eggs in various places in the pen in which she was confined. These were collected in one place by the male, who rolled them gently and carefully along with his beak. He then sat upon them himself, and continued to do so with the utmost assiduity for nine weeks, during which time the female never took his place, nor was he ever observed to leave the nest. When the young were hatched*, he alone took charge of them, and has continued to do so ever since, the female not appearing to notice them in any way. On reading this anecdote, many persons would suppose that the female emu was not possessed of that natural affection for its young which other birds have. In order to rescue it from this supposition, I will mention that a female emu, belonging to the Duke of Devonshire, at Chiswick, lately laid some eggs; and as there was no male bird, she collected them together herself and sat upon them.

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* There are now (June) five young emus alive, and appearing perfectly healthy.

> 'Well, it happened to one of the labouring men, in breaking 'the stones to make metal for the roads, that he broke a stone 'that was both large and remarkable; and in the heart of it, 'which was boss, there was found a living creature, that jumped 'out the moment it saw the light of heaven.—It was just a yird 'toad.'—ANNALS OF THE PARISH.

I REMEMBER some years ago getting up into a mulberry-tree, and finding in the fork of the two main branches a large toad almost embedded in the bark of the tree, which had grown over it so much, that he was quite unable to extricate himself, and would probably in time be completely covered over with the bark. Indeed, as the tree increased in size, there seems to be no reason why the toad should not in process of time become embedded in the tree itself, as was the case with the end of an oak rail that had been inserted into an elm-tree, which stood close to a public footpath. This, being broken off and grown over, was, on the tree being felled and sawn in two, found nearly in the centre of it. The two circumstances together may explain the curious fact of toads having been found alive in the middle of trees, by showing that the bark having once covered them, the process of growth in the tree would annually convey the toad more nearly to the centre of it, as happened with the piece of oak-rail;

and by showing that toads, and probably other amphibia, can exist on the absorption of fluids by the skin alone. This is confirmed by the following fact. A gentleman informed me that he put a toad into a small flower-pot, and secured it so that no insect could penetrate into it, and then buried it in the ground at a sufficient depth to protect it from the influence of frost. At the end of twenty years he took it up, and found the toad increased in size, and apparently healthy. Dr. Townson, in his tracts on the respiration of the amphibia, proves, I think satisfactorily, from actual experiment, that, while those animals with whose economy we are best acquainted receive their principal supply of liquids by the mouth, the frog and salamander tribes take in theirs through the skin alone; all the aqueous fluid which they take in being absorbed by the skin, and all they reject being transpired through it. He found that a frog absorbed nearly its own weight of water in the short time of an hour and a half, and that by being merely placed on blotting-paper well soaked with water; and it is believed that they never discharge it, except when they are disturbed or pursued, and then they only eject it to lighten their bodies, and facilitate their escape. That the moisture thus imbibed is sufficient to enable some of the amphibia to exist without any other food, there cannot I think be a reasonable doubt; and if this is admitted, the circumstance of toads being found alive in the centre of trees is accounted for by this and the preceding facts related*.

In additional proof however of what has been advanced, I may mention that the respectable proprietor of some extensive coal-mines in Staffordshire informed me that his men, in working into a stratum of thick coal at a very considerable depth, found three live eels in a small deposit of water in the centre of a block of coal†, which died as soon as they were taken out of it. Another case was mentioned to me by an eminent physician. A wet spot had always been observed on a freestone mantelpiece, which afterwards cracked at that place, and upon its being taken down, a toad was found in it, dead; but its death was probably owing to the want of that moisture which it had been enabled to imbibe when the stone was in the quarry, and which gradually lessened by the action of the fire, as from the moisture which appeared on that part of the mantelpiece, some time after it was put up, there seems but little reason to doubt that the toad was alive at that time*.

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* In one of the volumes published by the Academy of Sciences at Paris there is an account of a live toad being in the centre of an elm-tree, and of another in an oak. Both trees were sound and thriving. There is also a well-authenticated account in the Annual Register of a toad being found in the middle of a large and hard stone, which had no visible aperture by which it could get there.

† As this assertion may astonish the geologists, I think it right to mention that the gentleman who communicated the circumstance to me did not see the eels himself, but heard it from his workmen, who, however, one would think could have no object in deceiving him in a matter of this sort. The men called them eels, but they might possibly be the genus of amphibia living in dark caverns, the Proteus, of which Sir Humphry Davy has given an account in his 'Consolations in Travel.' I am not aware of any communication with the external world by which eels could reach the place where they were said to have been found found.

I may here mention a curious observation I made in regard to some frogs that had fallen down a small area which gave light to one of the windows of my house. The top of the area, being on a level with the ground, was covered over with some iron bars, through which the frogs fell.

During dry and warm weather, when they could not absorb much moisture, I observed them to appear almost torpid; but when it rained they became impatient of their confinement, and endeavoured to make their escape, which they did in the following manner. The wall of the area was about five feet in height, and plastered and whitewashed as smooth as the ceiling of a room. Upon this surface the frogs soon found that their claws would render them little or no assistance; they therefore contracted their large feet, so as to make a hollow in the centre, and by means of the moisture which they had imbibed in consequence of the rain, they contrived to produce a vacuum, so that by the pressure of the air on the extended feet (in the same way that we see boys take up a stone by means of a piece of wet leather fastened to a string) they ascended the wall, and made their escape. This happened constantly in the course of three years.

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* Blumenbach, in his Elements of Natural History, says that it is indisputable that living toads have been found in sawing through blocks of stone, trees, &c.

It is a curious fact that toads are so numerous in the island of Jersey, that they have become a term of reproach for its inhabitants, the word 'Crapaud' being frequently applied to them; while in the neighbouring island of Guernsey not a toad is to be found, though they have frequently been imported. Indeed, certain other islands have always been privileged in this respect. Ireland is free from venomous animals, of course by the aid of St. Patrick. The same was affirmed of Crete in olden times, being the birth-place of Jupiter. The Isle of Man is said also to be free from venomous creatures. The Mauritius, and I believe one of the Balearic islands, enjoys the same immunity.

> 'The snake, renew'd in all his speckled pride
> 'Of pompous youth, has cast his slough aside;
> 'And in his summer livery rolls along
> 'Erect, and brandishing his forked tongue.'
>
> DRYDEN.

WHEN I was lately at Brighton I met with a man who employed himself in summer in catching adders, the fat of which he preserved and sold as a sovereign remedy for hurts and swellings, and some other parts of the animal went to the apothecaries to be used in their materia medica. This man in catching adders used a forked stick and a shorter one. With the first he pinned the adder to the ground, and killed it with the other. He was accompanied by a dog, who hunted for these animals, and who, when he had found one, contrived generally to seize it by the middle, and shake it with so much rapidity against the sides of his head, that not one adder in a hundred had time to bite him before he killed it. His owner, however, informed me, that when this happened his head instantly swelled, but the swelling was almost as quickly removed by rubbing it with some of the fat of adders, which he always carried about with him for the purpose. Twenty-five adders yielded about half a pound weight of fat. They feed on worms, mice, frogs, and young birds; and before the winter sets in, would appear to quit the open downs, where they are found in summer, for the neighbouring woods, as a woodman told me he had found near sixty of them clustered together in a torpid state, in grubbing up an old tree in one of Lord Chichester's woods. They will, however, hybernize (if I may use the word) with the common snake and the slow or blind worm *, each of these having been found with some vipers in a torpid state, on digging a drain in the grounds of Burwood Park, at Walton on Thames, a short time ago. The viper-catcher whom I met with near Brighton assured me that he had frequently seen the young vipers take refuge in the inside of their mother by running into her mouth, which she opens for that purpose when danger is apprehended. He also assured me that they are produced alive, the ova being hatched in the inside of the mother, from which they probably creep, as they must do at a more advanced state, after they have made it their place of refuge †. He also informed me that, by

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* In America it is a spring amusement for the farmers to go in search of snakes while hybernizing, when they find them in caves and clefts of rocks, knotted together by hundreds. The stench is stated to be sometimes intolerable. Bartram has some curious particulars respecting snakes.

† The mode of parturition stated by the viper-catcher is generally supposed to be a vulgar error. He seemed, however, very confident that he was right. May not the viper, like the lizard, be ovo-viviparous? Some naturalists are of the same opinion as the viper-catcher mentioned, viz., that the eggs are hatched in the womb.

letting vipers bite a piece of rag, and then suddenly snatching it from their mouth, he easily extracted the fangs, and that he then frequently put them between his shirt and skin, and brought them away alive.

Snakes are easily tamed, an instance of which is mentioned in Mr. White's Naturalists' Calendar; and there is a stuffed specimen of a snake now in the Zoological Museum, which when alive was perfectly tame, and had been eleven years in the possession of the gentleman who presented it to that society, and to whom it showed a strong attachment. Eton boys have always been great tamers of snakes, and many anecdotes are related by them of their attachment to their owners.

Snakes, unlike the viper, are oviparous, and their eggs are linked together in a sort of chain, and are each about as big as a large marble. They feed on frogs, mice, certain insects, and also young birds. It is supposed by some people that they destroy the eggs of partridges and pheasants; and for this reason many gamekeepers make a point of killing them. Snakes have sometimes been found on the branches of trees, where they have contrived to get in search of young birds. A person lately informed me that he had found one in that situation. A snake has been seen to swallow a newly-hatched chicken; and I once observed one in the act of attempting to swallow a full-grown frog. I was attracted to the spot by the cries of the latter, which were very loud and piteous. The snake made great efforts to get the frog down his throat, which he at last succeeded in doing. By trampling on a snake which has just swallowed a frog, the latter is easily ejected from the stomach of the former.

The fact of snakes annually casting their skin or slough is very curious. I have found the slough of one twisted amongst some young quicksets in a hedge-row, and appearing perfectly fresh. Shakspeare seems to have been aware of this.

> '——There the snake throws her enamell'd skin.'
> MIDS. NIGHT'S DREAM.

The circumstance of the slough being twisted in the way I found it amongst some twigs seems to prove that the snake had not been able to rid himself of it without having recourse to something not very pliable which would assist her in the operation, although Mr. White says that he had found the slough in a field near a hedge. His account is very agreeable, He says, 'About the middle of this month (September) we found in a field, near a hedge, the slough 'of a large snake, which seemed to have been newly 'cast. From circumstances it appeared to have been 'drawn off backward, like a stocking or woman's 'glove. Not only the whole skin, but the scales 'from the very eyes, were peeled off, and appeared 'in the head of the slough like a pair of spectacles. 'The reptile, at the time of changing his coat, had 'entangled himself intricately in the grass and 'weeds; so that the friction of the stalk and blades 'might promote this curious shifting of his exuviæ.

'—— Lubrica serpens
'Exuit in spinis vestem.

Lucret.

'It would be a most entertaining sight could a 'person be an eye-witness to such a feat, and see the 'snake in the act of changing his garment. As the 'convexity of the eyes in the slough is now inward, 'that circumstance alone is a proof that the skin has 'been turned; not to mention that now the present 'inside is much darker than the outer. If you look 'through the scales of the snake's eyes from the 'concave side, viz. as the reptile used them, they 'lessen objects much. Thus it appears, from what 'has been said, that snakes crawl out of the mouth 'of their own sloughs, and quit the tail part last, 'just as eels are skinned by a cookmaid. While the 'scales of the eyes are growing loose, and a new skin 'is forming, the creature in appearance must be 'blind, and feel itself in a very awkward and uneasy 'situation.'

'The nest of a bird is one of those daily miracles, that, from its 'familiarity, is passed over without regard.'

His present Majesty, when residing in Bushy Park, had a part of the foremast of the Victory, against which Lord Nelson was standing when he received his fatal wound, deposited in a small temple in the grounds of Bushy House, from which it was afterwards removed, and placed at the upper end of the dining-room, with a bust of Lord Nelson upon it. A large shot had passed completely through this part of the mast, and while it was in the temple a pair of robins had built their nest in the shot-hole, and reared a brood of young ones. It was impossible to witness this little occurrence without reflecting on the scene of blood, and strife of war, which had occurred to produce so snug and peaceable a retreat for a nest of harmless robins. If that delightful poet of the lakes, Mr. Wordsworth, should ever condescend to read this little anecdote, it might supply him with no bad subject for one of his charming sonnets.

There is something extremely curious in the situations which birds sometimes select to build their nests in. Mr. White, in his Natural History of Selborne, mentions two remarkable facts of swallows having built their nests in odd situations, one on the handles of a pair of garden-shears, which were stuck up against the boards of an outhouse; and the other on the wings and body of an owl that happened by accident to hang dead and dry from the rafter of a barn. Having occasion myself to call some years ago on the Rev. Egerton Bagot, of Pipe Hayes in Warwickshire, I was surprised at seeing a swallow's nest built on the knocker of his hall door, and the parent bird in the act of incubation. When the door was opened (a circumstance which occurred frequently in the course of the day), the bird left her nest for an instant, but returned to it as soon as it was shut. I afterwards learnt that the swallow hatched, and that her young arrived at maturity. Some birds indeed show great boldness in the situation in which they build their nests, as if they depended on the kindness and protection of those under whose care they seem to place themselves. Thus a whitethroat had its nest for three years on a vine close to my parlour window, where it was quite open to observation; and a robin built on the shelf of my greenhouse, which was constantly visited, and the bird looked at while sitting; but she never left her nest at those times, and seemed perfectly secure and contented. There is something very agreeable to me in this confidence of protection, which I like to think that I have produced by constantly feeding them in winter, and never allowing their nests to be taken.

A robin, when its young are in danger, has a peculiarly plaintive note, which I am well acquainted with, and which I never hear without going to its assistance, when I generally find that a cat has occasioned the call for help by prowling near the nest containing the young birds*.

Robins, more than any other birds I have noticed, vary the form of and the materials with which they build their nests, according to the situation in which they are placed. Thus the robin who had its nest on the shelf of the greenhouse surrounded it with a great quantity of oak-leaves; while another, who for two years built amongst the straw which covered some sea-cale in my kitchen-garden had its nest composed of a small quantity of moss only, and lined with hair. Another, who built in a trained gooseberry-bush against a wall, used also moss and hair, with some few oak-leaves; and in some instances, where robins have used a large hole in a bank to build their nest in, the sides of the hole have been completely filled in with a great quantity of oak-leaves. I mention this the more particularly, because, in a delightful work on the Architecture of Birds, which I have just seen, the ingenious and observant author of many curious remarks in it, says that oak-leaves are seldom if ever used for the foundation of the redbreast's nest. I am more inclined to think that some birds, and the robin amongst the number, vary the materials with which their nests are built, not so much from the difficulty of procuring them, as for the purpose of assimilating their nests more nearly to the appearance of the objects which surround the situation in which they are built. I have observed this in a wren's nest, built in the thatch of a shed, and in another in a hay-rick, both of which had the external appearance of their nests different*. I have also observed, that when a chaffinch has built its nest against a branch of some tree, the moss or lichens which compose the exterior part of the nest are similar in appearance to those which are found on the tree itself; so that it is sometimes very difficult to perceive the nest. This fact is curious, as it shows a powerful instinctive foresight, and may account to the ingenious naturalist above referred to for his not having found two chaffinches' nests exactly alike amongst the twelve specimens in his collection.

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* I may here mention a curious fact which was communicated to me by a gentleman who had it from Mr. Knight of Downton. A fly-catcher built in his stove several successive years. He observed that the bird quitted its eggs whenever the thermometer was above (he thinks) 71 or 72°, and resumed her place upon the nest when the thermometer sunk below again. This fact leads us to account for another, respecting ostriches, which are observed by travellers to be absent from their eggs in the day-time, but to sit upon them during the night. That they do this is shown by the fact of the ostrich feathers being of less value during the period of incubation than they are before or after. At that time they are tinged with red, which the Hottentots say is occasioned by their sitting on the red earth to hatch their eggs. I have this information from Mr. Birchall, who however says that he never saw an ostrich on the nest in the day-time.

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* I have a wren's nest in my possession, built amongst some litter thrown into a yard. It so nearly resembled the surrounding objects, that it was only discovered by the birds flying out of it. Some of the straws which compose it are so thick, that one wonders how so small a bird could have used them.

Since writing the above, I have had the nest of a long-tailed titmouse brought to me, built on the branch of an elm in Bushy Park. The branch is about the thickness of a man's leg, and the nest is so artfully placed upon it, and made so nearly to resemble the knot of a tree, that it is extremely difficult to perceive that it is a nest. In order to render the deception more perfect, the nest is by no means too large an excrescence from the branch, which it would be if it was as large as those built by the same species of birds in more concealed situations. On the contrary, it is small and compact, and covered with lichens so nearly resembling the bark of the elm, that although the branch of the tree overhangs a footpath, along which at least thirty workmen passed and repassed four times a day, and the nest was not more than two feet above their heads, it was only at last seen by one of them.

This nest has a feather fixed so as to overhang the entrance, forming a sort of valve, and which was pushed in or out as the birds left the nest or came into it. It must have been placed there, one would think, to add to the warmth of the nest during the very cold weather which prevailed at the time the birds were laying their eggs.

The nest of the wood-pigeon, although composed of the rudest materials (only a few dead sticks), will be found admirably calculated for the purpose of concealment. How often have I observed the strong rapid flight of a wood-pigeon from a tree, and heard the noise produced by his wings, and then looked up into the tree, expecting to see his nest, without being able to perceive it! This has been owing to the various deposits of dead leaves and small branches which have been accumulated in various parts of the tree, and which have exactly the same appearance which the nest of the wood-pigeon has.

I must also mention a curious instinctive property which I have observed in some birds, tending very materially to the preservation of their young.

The excrement of the young of many birds who build their nests without any pretensions to concealment, such as the swallow, crow, &c., may at all times be observed about or under the nest, while that of some of those birds, whose nests are more industriously concealed, is conveyed away in the mouths of the parent birds, who generally drop it at a distance of twenty or thirty yards from the nest. Were it not for this precaution, the excrement itself, from its accumulation, and commonly from its very colour, would point out the place where the young were concealed.

As soon as the birds are ready to fly, or nearly so, the old birds do not consider it any longer necessary to continue to remove the excrement.

It is a curious fact that the males of migrating birds, or at least of some species, arrive some weeks before the females. An experienced and intelligent bird-catcher assures me that the male nightingale generally makes its appearance in this country about the first of April, and the female about a month afterwards; and that his song increases in power, and is longer continued, when the period for the arrival of the female is near at hand. A favourite bush having been selected, the nightingale awaits the appearance of his mate in or near it, singing his song of love, and greeting her arrival with all the little blandishments of affection. When she begins to sit, his song is less frequent and less powerful, and ceases soon after the young are hatched.

The black-cap, whose song is scarcely less pleasing than that of the nightingale, arrives also some time before the female, and calls her to him in the same *poetical* manner. I have one of these birds in my possession: his song is wild and sweet; and, as Mr. White says, when he sings in earnest, he pours forth very sweet but inward melody, and expresses great variety of soft and gentle modulations, superior perhaps to those of any of our warblers, the nightingale excepted.

The bird-catcher above referred to showed me his call-birds, and gave me some proofs of their skill. On seeing some strange birds, they immediately begin their call, which is succeeded by their song, and this seldom ceases till the wild birds are trapped. He says the call-birds then show a degree of pleasure which cannot be mistaken; and he seems persuaded that his birds are fully aware of the purpose for which their call and song are required.

The wheatear arrives about the middle or end of March, and builds its nest in rabbit-burrows. At least they do so occasionally, as I have had one brought to me which was found in digging out a rabbit. A shepherd whom I met on the Brighton Downs informed me that these birds are annually getting less numerous, and forsaking those haunts which they formerly most frequented.

Magpies congregate in considerable numbers on the Brighton Downs, as we counted last winter from twenty to thirty in a flock. Probably the want of wood keeps them together as a precautionary measure; and they have a scout, like the crow, who looks out for danger while his companions are feeding. They seemed very wild, and took long flights on being disturbed.

The periodical flight of birds is very curious. That in the spring is much less considerable than the autumnal one; September, October, and November being the chief months for the passage of various kind of birds. Bird-catchers state that the flights take place from day-break to twelve at noon, and sometimes from two o'clock till it is nearly dark. Birds fly against the wind during their passage, with the exception of the chaffinch, who flies across it. The male chaffinches are observed to fly by themselves, and are shortly followed by the females This is also the case with the titlark.

Birds flock together in February, for the purpose of choosing their mates ; and probably in the autumn, for leading their young to places where they can procure food, or enjoy a climate congenial with their nature. Many flocks of birds, however, appear and disappear in places where they had not previously been seen for many years. In the month of December, 1818, a very large flock of the small wild blue pigeon passed along the coast of Sussex, and many of them were shot near Brighton. These birds were formerly very numerous in this country, but are, I believe, now seldom met with. The last I saw was a pair, about ten years ago, who had built amongst some rocks, in a small bay near Swansea. The most extraordinary instance, however, I have witnessed of the sudden congregation of birds, occurred in the summer of the same year, which was a particularly hot and dry one. No rain had fallen for some weeks previous to the 26th of July. Flowers of every description had entirely disappeared, and the ground was parched to an extraordinary degree.

millions, seven hundred and twelve thousand bushels a day. Nor is the account of their roosting places less curious. One of them on the banks of the Green River in Kentucky was repeatedly visited by Mr. Audubon. It was in a portion of the forest where the trees were of great magnitude, and where there was little underwood, and the average breadth was about three miles. On arriving there about two hours before sunset, few pigeons were to be seen. A great number of persons, however, with horses and waggons, guns and ammunition, had already established themselves on the borders. Two farmers had driven upwards of three hundred hogs from their residence, more than a hundred miles distant, to be fattened on the pigeons which were to be slaughtered. The sun had set, yet not a pigeon had arrived. Everything, however, was ready, and all eyes were gazing on the clear sky, which appeared in glimpses amidst the tall trees. Suddenly there burst forth a general cry of "Here they come!" The noise which they made, though yet distant, is described as like a hard gale at sea passing through the rigging of a close-reefed vessel. As the birds arrived, they were knocked down by thousands by the pole-men. As they continued to pour in, the fires were lighted, and a magnificent, as well as wonderful sight presented itself. The pigeons, arriving by myriads, alighted everywhere, one above another, until solid masses, as large as hogsheads,

cable, as the birds poured in in countless multitudes, he rose, and counting the dots already put down, found that one hundred and sixty-three had been made in twenty-one minutes. He then travelled on, and still met more as he proceeded. The air was literally filled with pigeons; the light of noon-day was obscured as by an eclipse, the dung fell in spots not unlike melting flakes of snow, and the continued buzz of wings had a tendency to lull his senses to repose. Whilst waiting for his dinner, immense legions were still going by, and on Mr. Audubon's arrival before sunset at Louisville, distant from Hardensburgh fifty-five miles, the pigeons were still passing in undiminished numbers, and continued to do so for three days in succession.

Mr. Audubon makes the following curious estimate of the number of pigeons contained in *one only* of these mighty flocks. Taking a column of one mile in breadth, which he thinks is far below the average size, and supposing it to pass over without interruption for three hours, at the rate of one mile in a minute, it will give us a parallelogram of one hundred and eighty miles by one, covering one hundred and eighty square miles. Allowing two pigeons to the square yard, we have one billion, one hundred and fifteen millions, one hundred and thirty-six thousand pigeons in one flock. As each pigeon daily consumes fully half a pint of food, the quantity necessary for supplying this vast multitude must be eight

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were formed on the branches all round. Here and there the perches gave way under the weight, with a crash, and falling to the ground, destroyed hundreds of the birds beneath, forcing down the dense groups with which every stick was loaded. The pigeons kept constantly coming, and it was past midnight before a decrease in the number of those that arrived could be perceived. The noise made was so great, that it was distinctly heard at three miles from the spot. Towards the approach of day, the noise in some measure subsided, and long before objects were distinguishable, the pigeons began to move off in a direction quite different from that in which they had arrived the evening before, and at sunrise all that were able to fly had disappeared.

depths, where they must have lain through a succession of ages, only requiring the energies of man to bring them into action. In boring for water lately at a spot near Kingston-on-Thames, some earth was brought up from a depth of three hundred and sixty feet; this earth was carefully covered over with a hand glass, to prevent the possibility of any other seeds being deposited upon it, yet in a short time plants vegetated from it. If quick lime be put upon land which from time immemorial has produced nothing but heather, the heather will be killed, and white clover spring up in its place*.

A curious fact was communicated to me, respecting some land which surrounds an old castle, formerly belonging to Randolph Earl of Murray, near Moffatt. On removing the peat, which is about six or eight inches in thickness, a stratum of soil appears, which is supposed to have been a cultivated garden in the time of the Earl, (1290,) and from which a variety of flowers and plants spring, some of them little known even at this time in Scotland.

The care which is taken to supply the ground with those seeds which, from probably being of a farinaceous nature, would not preserve their vital powers through a succession of ages, as other seeds do, is very curious. Many of them are deposited by crows and other birds and animals. The Rev. Mr. Robinson, in his Natural History of Westmoreland and Cumberland, says that 'birds are natural planters 'of all sorts of trees, disseminating the kernels upon 'the earth, till they grow up to their natural strength 'and perfection.' He tells us 'that early one morn'ing he observed a great number of crows very busy 'at their work, upon a declining ground of a mossy 'surface, and that he went out of his way on purpose 'to view their labour. He then found that they 'were planting a grove of oaks*. The manner of 'their planting was thus. They first made little 'holes in the earth with their bills, going about and 'about till the hole was deep enough, and then they 'dropped in the acorn, and covered it with earth 'and moss. The young plantation,' Mr. Robinson adds, 'is now growing up to a thick grove of oaks, 'fit for use, and of height for the crows to build 'their nests in. On telling the circumstance to the 'owner of the ground, who observed the acorns to 'spring up, he took care to secure their growth and 'rising. The season was the latter end of autumn, 'when all seeds are fully ripe.'

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* The *Didymodon flexifolium* used to be found most sparingly by the keenest muscologists. Dr. Greville found a patch of it where heath had been burnt in Devonshire, and since that it has been found in several places in Scotland and elsewhere, in similar situations.

Mr. Edwards observes that even the droughts of the autumn continue to increase and propagate seeds real motion *. The following exemplification of this tendency is taken from the Memoirs of the American Academy of Arts and Sciences at Boston.

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* I have observed in another place that rooks probably bury seeds for the purpose of feeding upon them in the winter.

In the spring a potato was left behind in a cellar where some roots had been kept during the winter, and which had only a small aperture of light at the upper part of one of its sides. The potato, which lay in the opposite corner of this aperture, shot out a runner, which first ran twenty feet along the ground, then crept up along the wall, and so through the opening by which light was admitted.

Those plants which are of the greatest importance to mankind are endowed by Providence either with the property of adapting themselves to a great variety of climates, or, when confined to any individual climate, of flourishing there in any kind of soil. This is the case with several species of grain—the potato, &c.; and the cocoa-palm vegetates vigorously in sandy and stony as well as in the richest earth †.

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* Blumenbach. † Idem.

'The twigs of the common wild-rose often shoot out into a beau-
'tiful tuft of numerous reddish moss-like fibres, wholly dissimilar
'from the leaves of the plant, deemed by old naturalists a very valu-
'able medical substance, to which they gave the name of bedeguar.'
KIRBY AND SPENCE.

I HAVE often admired a small, round, mossy substance attached to a branch of the dog-rose growing in our hedges, and which I was unable to account for until the following circumstance was related to me by an ingenious florist and nurseryman in the King's-road (Mr. Knight), one to whom every admirer of rare and beautiful plants is much indebted, and by whose exertions and skill a new *rhododendron arborea* is at this time (April) in splendid bloom, and without a rival, I believe, in this country.

Mr. Knight informed me that, having been requested by one of his customers to endeavour to preserve a favourite mulberry-tree, which for many years had flourished on her lawn, but which, with the exception of one very large branch, was either dead or decaying, he waited till the sap had ascended, and then barked the branch completely round near its junction with the trunk of the tree. Having filled three sacks with mould, he tied them round that part of the branch which had been barked, and by means of one or two old watering-pots, which were kept filled with water, and placed

About six o'clock in the evening of that day, some rain fell. I was at the time standing at a window, looking on the river Thames. In an instant the surface of the river was covered with an incredible number of swallows, which remained flying, some near the water, and others at a considerable height above, till the rain had ceased, when not one of them was to be seen. I have also observed nearly a similar circumstance on the roof of the Tennis Court, at Hampton Court. A vast flight of swallows have alighted upon it, and after remaining there for a few hours, have entirely disappeared. Sometimes they assemble and roost on the willows which overhang the banks of the Aytes in the Thames, and I have also seen them settle in prodigious numbers on the turf on Molesey Hurst. Our assemblages of birds, however, are nothing when compared with the flocks of the passenger pigeon (Columba migratoria) of America. Audubon, in his Ornithological Biography, gives a curious and interesting account of the flight of these birds. He says that in passing over the Barrens, a few miles from Hardensburgh, he observed the pigeons flying from north-east to south-west, in greater numbers than he had ever seen them before; and feeling an inclination to count the flocks that might pass within the reach of his eye in one hour, he seated himself on an eminence, and began to mark with his pencil, making a dot for every flock that passed. In a short time finding the task impracti-

cable, as the birds poured in in countless multitudes, he rose, and counting the dots already put down, found that one hundred and sixty-three had been made in twenty-one minutes. He then travelled on, and still met more as he proceeded. The air was literally filled with pigeons; the light of noon-day was obscured as by an eclipse, the dung fell in spots not unlike melting flakes of snow, and the continued buzz of wings had a tendency to lull his senses to repose. Whilst waiting for his dinner, immense legions were still going by, and on Mr. Audubon's arrival before sunset at Louisville, distant from Hardensburgh fifty-five miles, the pigeons were still passing in undiminished numbers, and continued to do so for three days in succession.

Mr. Audubon makes the following curious estimate of the number of pigeons contained in *one only* of these mighty flocks. Taking a column of one mile in breadth, which he thinks is far below the average size, and supposing it to pass over without interruption for three hours, at the rate of one mile in a minute, it will give us a parallelogram of one hundred and eighty miles by one, covering one hundred and eighty square miles. Allowing two pigeons to the square yard, we have one billion, one hundred and fifteen millions, one hundred and thirty-six thousand pigeons in one flock. As each pigeon daily consumes fully half a pint of food, the quantity necessary for supplying this vast multitude must be eight

The bird-catcher above referred to showed me his call-birds, and gave me some proofs of their skill. On seeing some strange birds, they immediately begin their call, which is succeeded by their song, and this seldom ceases till the wild birds are trapped. He says the call-birds then show a degree of pleasure which cannot be mistaken; and he seems persuaded that his birds are fully aware of the purpose for which their call and song are required.

The wheatear arrives about the middle or end of March, and builds its nest in rabbit-burrows. At least they do so occasionally, as I have had one brought to me which was found in digging out a rabbit. A shepherd whom I met on the Brighton Downs informed me that these birds are annually getting less numerous, and forsaking those haunts which they formerly most frequented.

Magpies congregate in considerable numbers on the Brighton Downs, as we counted last winter from twenty to thirty in a flock. Probably the want of wood keeps them together as a precautionary measure; and they have a scout, like the crow, who looks out for danger while his companions are feeding. They seemed very wild, and took long flights on being disturbed.

The periodical flight of birds is very curious. That in the spring is much less considerable than the autumnal one; September, October, and November being the chief months for the passage of various kind of birds. Bird-catchers state that the flights take place from day-break to twelve at noon, and sometimes from two o'clock till it is nearly dark. Birds fly against the wind during their passage, with the exception of the chaffinch, who flies across it. The male chaffinches are observed to fly by themselves, and are shortly followed by the females This is also the case with the titlark.

Birds flock together in February, for the purpose of choosing their mates ; and probably in the autumn, for leading their young to places where they can procure food, or enjoy a climate congenial with their nature. Many flocks of birds, however, appear and disappear in places where they had not previously been seen for many years. In the month of December, 1818, a very large flock of the small wild blue pigeon passed along the coast of Sussex, and many of them were shot near Brighton. These birds were formerly very numerous in this country, but are, I believe, now seldom met with. The last I saw was a pair, about ten years ago, who had built amongst some rocks, in a small bay near Swansea. The most extraordinary instance, however, I have witnessed of the sudden congregation of birds, occurred in the summer of the same year, which was a particularly hot and dry one. No rain had fallen for some weeks previous to the 26th of July. Flowers of every description had entirely disappeared, and the ground was parched to an extraordinary degree.

About six o'clock in the evening of that day, some rain fell. I was at the time standing at a window, looking on the river Thames. In an instant the surface of the river was covered with an incredible number of swallows, which remained flying, some near the water, and others at a considerable height above, till the rain had ceased, when not one of them was to be seen. I have also observed nearly a similar circumstance on the roof of the Tennis Court, at Hampton Court. A vast flight of swallows have alighted upon it, and after remaining there for a few hours, have entirely disappeared. Sometimes they assemble and roost on the willows which overhang the banks of the Aytes in the Thames, and I have also seen them settle in prodigious numbers on the turf on Molesey Hurst. Our assemblages of birds, however, are nothing when compared with the flocks of the passenger pigeon (Columba migratoria) of America. Audubon, in his Ornithological Biography, gives a curious and interesting account of the flight of these birds. He says that in passing over the Barrens, a few miles from Hardensburgh, he observed the pigeons flying from north-east to south-west, in greater numbers than he had ever seen them before; and feeling an inclination to count the flocks that might pass within the reach of his eye in one hour, he seated himself on an eminence, and began to mark with his pencil, making a dot for every flock that passed. In a short time finding the task impracti-

cable, as the birds poured in in countless multitudes, he rose, and counting the dots already put down, found that one hundred and sixty-three had been made in twenty-one minutes. He then travelled on, and still met more as he proceeded. The air was literally filled with pigeons; the light of noon-day was obscured as by an eclipse, the dung fell in spots not unlike melting flakes of snow, and the continued buzz of wings had a tendency to lull his senses to repose. Whilst waiting for his dinner, immense legions were still going by, and on Mr. Audubon's arrival before sunset at Louisville, distant from Hardensburgh fifty-five miles, the pigeons were still passing in undiminished numbers, and continued to do so for three days in succession.

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millions, seven hundred and twelve thousand bushels a day. Nor is the account of their roosting places less curious. One of them on the banks of the Green River in Kentucky was repeatedly visited by Mr. Audubon. It was in a portion of the forest where the trees were of great magnitude, and where there was little underwood, and the average breadth was about three miles. On arriving there about two hours before sunset, few pigeons were to be seen. A great number of persons, however, with horses and waggons, guns and ammunition, had already established themselves on the borders. Two farmers had driven upwards of three hundred hogs from their residence, more than a hundred miles distant, to be fattened on the pigeons which were to be slaughtered. The sun had set, yet not a pigeon had arrived. Everything, however, was ready, and all eyes were gazing on the clear sky, which appeared in glimpses amidst the tall trees. Suddenly there burst forth a general cry of "Here they come!" The noise which they made, though yet distant, is described as like a hard gale at sea passing through the rigging of a close-reefed vessel. As the birds arrived, they were knocked down by thousands by the pole-men. As they continued to pour in, the fires were lighted, and a magnificent, as well as wonderful sight presented itself. The pigeons, arriving by myriads, alighted everywhere, one above another, until solid masses, as large as hogsheads,

were formed on the branches all round. Here and there the perches gave way under the weight, with a crash, and falling to the ground, destroyed hundreds of the birds beneath, forcing down the dense groups with which every stick was loaded. The pigeons kept constantly coming, and it was past midnight before a decrease in the number of those that arrived could be perceived. The noise made was so great, that it was distinctly heard at three miles from the spot. Towards the approach of day, the noise in some measure subsided, and long before objects were distinguishable, the pigeons began to move off in a direction quite different from that in which they had arrived the evening before, and at sunrise all that were able to fly had disappeared.

———'And well-shower'd earth
'Is deep enrich'd with vegetable life.'
THOMSON.

FEW things appear to be more curious than the fact, that the seeds of various plants and flowers, which have lain dormant in the ground through a succession of ages, have, either by being exposed to the air, been enabled to vegetate, or have been brought into action by the application of some compost or manure agreeable to their nature.

This was shown in trenching for a plantation a part of Bushy Park, which had probably been undisturbed by the spade or plough since, and perhaps long before, the reign of Charles I. The ground was turned up in the winter, and in the following summer it was covered with a profusion of the tree mignionette, pansies, and the wild raspberry,—plants which are nowhere found in a wild state in the neighbourhood; and in a plantation recently made in Richmond Park, a great quantity of the foxglove came up after some deep trenching. I observed a few years ago the same occurrence in a plantation in Devonshire, the surface of which was covered with the dark blue columbine *, a flower produced in our

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* I have since learnt that the columbine is found wild in the western counties.

gardens by cultivation, and I believe not known in this country in its wild state. A field also, which had previously little or no Dutch clover upon it, was covered with it after it had been much trampled upon, and fed down by horses; and it is stated from good authority, that if a pine forest in America were to be cut down, and the ground cultivated, and afterwards allowed to return to a state of nature, it would produce plants quite different from those by which it had been previously occupied. So completely indeed is the ground impregnated with seeds, that if earth is brought to the surface, from the lowest depth at which it is found, some vegetable matter will spring from it*. I have always considered this fact as one of the many surprising instances of the power and bounty of Almighty God, who has thus literally filled the earth with his goodness, by storing up a deposit of useful seeds in its depths, where they must have lain through a succession of ages, only requiring the energies of man to bring them into action. In boring for water lately at a spot near Kingston-on-Thames, some earth was brought up from a depth of three hundred and sixty feet; this earth was carefully covered over with a hand glass, to prevent the possibility of any other seeds being deposited upon it, yet in a short time plants vegetated from it. If quick lime be put upon land which from time immemorial has produced nothing but heather, the heather will be killed, and white clover spring up in its place*.

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* The *Hypecoum procumbens* was lost in the Upsal garden for forty years, but was accidentally resuscitated by digging the ground it had formerly occupied. A species of *Lobelia*, which had been missing for twenty years in the Amsterdam garden, was unexpectedly recovered in the same manner. There is a very curious account in Monson's Preludia Botanica, of the appearance of a species of mustard, *Sisymbrium Irio*, after the fire of London, and another species, *Sisymbrium Panonicum*, made its appearance suddenly among the ruins, after the fire of Moscow, and continues abundant there ever since. A gentleman tells me that he saw a crop of barley where oats had been sown, in Glamorganshire, and the farmer assured him that the ground had not been stirred before for thirty years. A similar circumstance occurred in Scotland.

A curious fact was communicated to me, respecting some land which surrounds an old castle, formerly belonging to Randolph Earl of Murray, near Moffatt. On removing the peat, which is about six or eight inches in thickness, a stratum of soil appears, which is supposed to have been a cultivated garden in the time of the Earl, (1290,) and from which a variety of flowers and plants spring, some of them little known even at this time in Scotland.

The care which is taken to supply the ground with those seeds which, from probably being of a farinaceous nature, would not preserve their vital powers through a succession of ages, as other seeds do, is very curious. Many of them are deposited by crows and other birds and animals. The Rev. Mr. Robinson, in his Natural History of Westmoreland and Cumberland, says that 'birds are natural planters 'of all sorts of trees, disseminating the kernels upon 'the earth, till they grow up to their natural strength 'and perfection.' He tells us 'that early one morning he observed a great number of crows very busy 'at their work, upon a declining ground of a mossy 'surface, and that he went out of his way on purpose 'to view their labour. He then found that they 'were planting a grove of oaks*. The manner of 'their planting was thus. They first made little 'holes in the earth with their bills, going about and 'about till the hole was deep enough, and then they 'dropped in the acorn, and covered it with earth 'and moss. The young plantation,' Mr. Robinson adds, 'is now growing up to a thick grove of oaks, 'fit for use, and of height for the crows to build 'their nests in. On telling the circumstance to the 'owner of the ground, who observed the acorns to 'spring up, he took care to secure their growth and 'rising. The season was the latter end of autumn, 'when all seeds are fully ripe.'

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* The *Didymodon flexifolium* used to be found most sparingly by the keenest muscologists. Dr. Greville found a patch of it where heath had been burnt in Devonshire, and since that it has been found in several places in Scotland and elsewhere, in similar situations.

Mr. Edwards observes that even the droughts of the autumn continue to increase and propagate seeds and plants; for, by causing deep chinks or chaps in the earth, the seeds of trees and larger plants that require depth are lodged at proper depths for their growth, and at the same time secured from such animals as feed on them.

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* I have observed in another place that rooks probably bury seeds for the purpose of feeding upon them in the winter.

Mice also bury a great number of seeds for their winter store, many of which vegetate:

> Sæpè exiguus mus
> Sub terris posuitque domos, atque horrea fecit—

and some seeds are provided with a sort of down, by which they are carried, with the help of the wind, to great distances; and others fix themselves on the ground by means of a glutinous substance attached to them.

It is a curious fact, in proof of what has been advanced, that more recent deposits of earth, such as peat, leaf-mould, &c., produce little or no vegetable substances, while, as has been shown, soil, from whatever depth it is brought, is impregnated with seeds, which grow freely on being exposed to the influence of light and air.

The coral reefs in the South Seas are first of all covered with marine substances—then with the excrements of birds, in which are undigested seeds, that spring up and flourish in the deposits which have been formed on the reefs. So various are the ways in which a beneficent Providence has enabled the earth to produce food for the benefit of his creatures, making an insignificant insect, and perhaps a small migrating bird, instruments by which he shows his power and goodness.

Many plants show a great fondness for particular spots, and it is not easy to eradicate them from it. In looking over an old History of Middlesex, I found mention made of a very small mountain pink, which had been discovered on a mound of earth which was pointed out in Hampton-Court Park. I went to the place at the time of the year when those plants are in flower, and readily discovered this pretty pink. Not one plant, however, could I find away from the mound, though I have repeatedly looked for them, nor are there any of the same variety growing wild in the neighbourhood.

The influence which particular soils have on the colours of flowers is very curious. Whoever has attended to the growth of the better sort of tulips knows that by planting them in too rich a soil the colours will—what florists call—*run;* and others, which have remained of one colour in some particular soil, will, on being removed to another, break into a variety of colours. If a common wild primrose is taken up, and the root separated, and planted in another soil, the blossom loses its brilliant yellow hue, and becomes of a pale brown or light chocolate colour.

The tendency observed in plants to follow light, which is so necessary for them, makes them display real motion [*]. The following exemplification of this tendency is taken from the Memoirs of the American Academy of Arts and Sciences at Boston.

In the spring a potato was left behind in a cellar where some roots had been kept during the winter, and which had only a small aperture of light at the upper part of one of its sides. The potato, which lay in the opposite corner of this aperture, shot out a runner, which first ran twenty feet along the ground, then crept up along the wall, and so through the opening by which light was admitted.

Those plants which are of the greatest importance to mankind are endowed by Providence either with the property of adapting themselves to a great variety of climates, or, when confined to any individual climate, of flourishing there in any kind of soil. This is the case with several species of grain—the potato, &c.; and the cocoa-palm vegetates vigorously in sandy and stony as well as in the richest earth [†].

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[*] Blumenbach.

[†] Idem.

> 'The twigs of the common wild-rose often shoot out into a beau-'tiful tuft of numerous reddish moss-like fibres, wholly dissimilar 'from the leaves of the plant, deemed by old naturalists a very valu-'able medical substance, to which they gave the name of bedeguar.'
>
> KIRBY AND SPENCE.

I HAVE often admired a small, round, mossy substance attached to a branch of the dog-rose growing in our hedges, and which I was unable to account for until the following circumstance was related to me by an ingenious florist and nurseryman in the King's-road (Mr. Knight), one to whom every admirer of rare and beautiful plants is much indebted, and by whose exertions and skill a new *rhododendron arborea* is at this time (April) in splendid bloom, and without a rival, I believe, in this country.

Mr. Knight informed me that, having been requested by one of his customers to endeavour to preserve a favourite mulberry-tree, which for many years had flourished on her lawn, but which, with the exception of one very large branch, was either dead or decaying, he waited till the sap had ascended, and then barked the branch completely round near its junction with the trunk of the tree. Having filled three sacks with mould, he tied them round that part of the branch which had been barked, and by means of one or two old watering-pots, which were kept filled with water, and placed

over the sacks, from which the water gradually distilled, the mould in the sacks was sufficiently moistened for his purpose. Towards the end of the year he examined the sacks, and found them filled with numerous small fibrous roots, which the sap, having no longer the bark for its conductor into the main roots of the tree, had thus expended itself in throwing out. A hole having been prepared near the spot, the branch was sawn off below the sacks, and planted with them, the branch being propped securely. The next summer it flourished and bore fruit, and is still in a thriving state.

Having heard this fact, I examined the mossy substance on the dog-rose, and found that, in consequence of the bark on the branch on which it was found having been removed by some insect, the sap in receding had thrown out roots, which, from exposure to the air, produced the mossy ball in question, and which was probably made the nest or hybernaculum of some insect *. This idea might be followed up practically in this country, as I have lately heard it is in China; and the more uncertain method of grafting or budding to increase our stock of plants might be abandoned for the method above mentioned.

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* If this mossy substance be examined, the larvæ of an insect will be found belonging to the genus *cynips*. Another species produces the gall-nut; and the birch-tree is subject to a disease, like that in the dog-rose perhaps, and occasioned probably by an insect. The gall-nuts however are very sportive.

'Preach as I please, I doubt our curious men
'Will choose a pheasant still before a hen.'
HORACE.

ONE of the keepers in Richmond Park informs me that he has often heard his father, who was also a keeper, mention that, in the reign of George the Second, a large flock of wild turkies, consisting of not less than two thousand, was regularly kept up as part of the stock of the park. In the autumn and winter they fed on acorns, of which they must have had an abundant supply, since the park was then almost entirely wooded with oak, with a thick cover of furze; and although at present eleven miles in circumference, it was formerly much larger, and connected with extensive possessions of the Crown, some of which are now alienated. Stacks of barley were also put up in different places in the park for their support; and some of the old turkey cocks are said to have weighed from twenty-five to thirty pounds. They were hunted with dogs, and made to take refuge in a tree, where they were frequently shot by George the Second. I have not been able to learn how long they had been preserved in the park before his reign, but they were totally destroyed towards the latter end of it, in consequence of the dangers to

which the keepers were exposed in protecting them from poachers, with whom they had many bloody fights, being frequently overpowered by them.

Though I have not been able, in any of the accounts which have been given of Richmond Park, to find a notice of the stock of turkies, there can, I think, be no doubt of the fact, since the ancestors of the present head and second keepers of the park had, for many generations, been keepers in it, and have handed down to their present successors many curious accounts of the fights which took place between them and the poachers, in the preservation of the turkies.

That turkies would increase rapidly in the park if left to themselves, there can be no doubt, as a stray hen turkey brought up a large brood, which I saw, and which were quite wild. They kept in a part of the park little frequented, and if disturbed, would take a flight and settle in trees: they were subsequently shot, and were in good condition. Had these birds been suffered to remain, they would probably have increased rapidly.

In one of the woods at Aston Hall, in Warwickshire, I saw, some years ago, both pea and Guinea fowl in the same wild state. The common domestic fowl would, if properly encouraged, become an inhabitant of our woods, and their flesh approach to the flavour of the pheasant. In Windsor Great Park the experiment was tried, and perfectly succeeded, the fowls requiring no more care or feeding than the pheasant. I was assured that these wild fowls were remarkably fine, and partook very much of the flavour of the pheasant.

The only wild turkies* which I can at present hear of, are to be found in the park of Sir Watkin Williams Wynne, at Wynstay, where there is a flock consisting of about five hundred. They were tried in Windsor Great Park, but did not succeed there. A few bustards are still to be found near Newmarket; but I believe they have quite deserted Salisbury Plain.

The peewit is much attached to its old haunts. A large plantation was made in a part of Richmond Park, where these birds had for many years been in the habit of breeding. They continued to do so until the young plants had attained a sufficient height and thickness to exclude them from the ground. They have since continued to lay their eggs near the same spot.

The Cape geese, which are kept in the large ponds in the same park, used to have their nests on the island in one of those ponds. In consequence, however, of their eggs having been frequently destroyed by the rats, they took to building in some oak pollards near the water, from whence they conveyed their young in safety. I have questioned the keepers as to their mode of doing this. Their opinion is, that the old birds get the young under their wings, and then descend the tree. It is more probable, however, that they carry them one by one in their mouths. I knew an instance of a wild duck, who had its nest in a poplar tree, which overhung a piece of water, in Staffordshire, and who contrived to convey its young with safety to the water.

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* I have since heard that there is a breed of wild turkies in a park belonging to Lord Ducie, in Gloucestershire.

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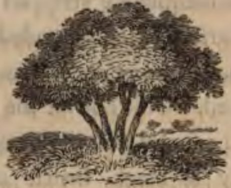
The tendency observed in plants to follow light, which is so necessary for them, makes them display crushed into powder, some idea may, perhaps, be formed of the effect produced by lightning.

While on the subject of trees, I will notice the present state of the old thorns in Bushy Park, from which it probably takes its name. These trees are generally supposed to have been in existence at the time of Oliver Cromwell (the park being then used as a hare park). As they increase in age, they have the property of separating themselves into different stems, some having four or five and even six, which, as they separate, become regularly barked round, forming to appearance so many distinct trees closely planted together, except that they all meet at the butt of the tree thus:—



Some of the thorns are now undergoing the process of separation, having already thrown out one stem, while in other parts they are deeply indented with seams down the whole stem. These, gradually deepening from opposite sides towards the centre, will at last split the tree into a number of separate stems which are barked round. In other trees the seam is hardly visible, though none of them are without it. This peculiarity seems confined to the thorn, and as I have not observed it in those which appear to have been more recently planted, it is probably the effect of great age, though the trees are still flourishing, and I know of few sights more beautiful than the fine old thorns in Bushy Park in full blossom. The yew tree, I have observed, is sometimes strongly marked with seams, especially those which have arrived at a great age, but I have not seen any in which the separation has actually taken place.

This remarkable property in the thorn is not noticed, as far as I remember, in any work I have met with. It seems, however, to be worthy of some attention, and might be the means of throwing light on the age of those trees.

There are two elm trees, or rather the remains of two, in Hampton Court Park, known by the name of the 'Giants,' which must have been of an enormous size, the trunk of one of them measuring twenty-eight feet in circumference. The only one I have met with of a larger size is by the side of the road at Crawley in Sussex, in the interior of which a party of five or six persons are stated to have dined, and from its external appearance I can easily believe this. Some one has placed a door in its side, and to the credit of the inhabitants of the village, it seems to be treated with the care and respect to which its venerable appearance entitles it. Perhaps the largest oak-tree in England is to be seen near the old stables

over the sacks, from which the water gradually distilled, the mould in the sacks was sufficiently moistened for his purpose. Towards the end of the year he examined the sacks, and found them filled with numerous small fibrous roots, which the sap, having no longer the bark for its conductor into the main roots of the tree, had thus expended itself in throwing out. A hole having been prepared near the spot, the branch was sawn off below the sacks, and planted with them, the branch being propped securely. The next summer it flourished and bore fruit, and is still in a thriving state.

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The only wild turkies* which I can at present hear of, are to be found in the park of Sir Watkin Williams Wynne, at Wynstay, where there is a flock consisting of about five hundred. They were tried in Windsor Great Park, but did not succeed there. A few bustards are still to be found near Newmarket; but I believe they have quite deserted Salisbury Plain.

The peewit is much attached to its old haunts. A large plantation was made in a part of Richmond Park, where these birds had for many years been in the habit of breeding. They continued to do so until the young plants had attained a sufficient height and thickness to exclude them from the ground. They have since continued to lay their eggs near the same spot.

The Cape geese, which are kept in the large ponds in the same park, used to have their nests on the island in one of those ponds. In consequence, however, of their eggs having been frequently destroyed by the rats, they took to building in some oak pollards near the water, from whence they conveyed their young in safety. I have questioned the keepers as to their mode of doing this. Their opinion is, that the old birds get the young under their wings, and then descend the tree. It is more probable, however, that they carry them one by one in their mouths. I knew an instance of a wild duck, who had its nest in a poplar tree, which overhung a piece of water, in Staffordshire, and who contrived to convey its young with safety to the water.

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* I have since heard that there is a breed of wild turkies in a park belonging to Lord Ducie, in Gloucestershire.

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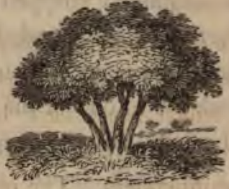
While on the subject of trees, I will notice the present state of the old thorns in Bushy Park, from which it probably takes its name. These trees are generally supposed to have been in existence at the time of Oliver Cromwell (the park being then used as a hare park). As they increase in age, they have the property of separating themselves into different stems, some having four or five and even six, which, as they separate, become regularly barked round, forming to appearance so many distinct trees closely planted together, except that they all meet at the butt of the tree thus :—



Some of the thorns are now undergoing the process of separation, having already thrown out one stem, while in other parts they are deeply indented with seams down the whole stem. These, gradually deepening from opposite sides towards the centre, will at last split the tree into a number of separate stems which are barked round. In other trees the seam is hardly visible, though none of them are without it. This peculiarity seems confined to the thorn, and as I have not observed it in those which appear to have been more recently planted, it is probably the effect of great age, though the trees are still flourishing, and I know of few sights more beautiful than the fine old thorns in Bushy Park in full blossom. The yew tree, I have observed, is sometimes strongly marked with seams, especially those which have arrived at a great age, but I have not seen any in which the separation has actually taken place.

This remarkable property in the thorn is not noticed, as far as I remember, in any work I have met with. It seems, however, to be worthy of some attention, and might be the means of throwing light on the age of those trees.

There are two elm trees, or rather the remains of two, in Hampton Court Park, known by the name of the 'Giants,' which must have been of an enormous size, the trunk of one of them measuring twenty-eight feet in circumference. The only one I have met with of a larger size is by the side of the road at Crawley in Sussex, in the interior of which a party of five or six persons are stated to have dined, and from its external appearance I can easily believe this. Some one has placed a door in its side, and to the credit of the inhabitants of the village, it seems to be treated with the care and respect to which its venerable appearance entitles it. Perhaps the largest oak-tree in England is to be seen near the old stables in Hampton Court Park. It is thirty-three feet round, and its diameter, therefore, eleven feet. I never see this beautiful tree (and I often go to admire it) without carrying my mind back to the time it was probably planted, and the ages which have since elapsed. The venerable old pollards, which were so sadly cut down on the enclosure of Windsor Forest, might have been thought to have sprung from, and not to have been coeval with it.

There is also a remarkably fine poplar tree in the stud-house grounds in the same park. The height of this tree is ninety-seven feet; and to look at it one might almost suppose that it was composed of several trees, so mighty are the branches which have shot up from the main trunk, within a short distance from the ground. This tree is fourteen feet in circumference, and near it is a thriving English elm, so called to distinguish it from the wych elm. There are seven hundred and ninety-six feet of solid timber in this tree. The trunk is forty-four feet in height, and eighteen feet in circumference. There is another elm near it, known by the name of King Charles's Swing, which has a most curious appearance. There are two enormous limbs growing from each side of the trunk, which at a height of eight feet six inches from the ground, measures thirty-eight feet round. Each of the limbs are about forty feet high, and are so healthy that they seem likely to become stupendous trees.

I always regret seeing the wych elm planted instead of the English. This latter is more expensive, as it is obliged to be propagated either by layers or by grafting it on the wych elm. In a work called an Appendix to New Improvements and Planting, &c., by R. Bradley, Professor of Botany in Cambridge, published in 1726, there is the following passage—'The elm, according to the forest terms, is not a timber tree, but is styled by the foresters, a weed.'

This seems to be a confirmation of the opinion that it is not indigenous, but is an intruder. That it is an exotic, I think is proved by the custom of nurserymen grafting it on the wych elm, which they would not do, could they raise it from seed. Very few old elm trees are found in the royal forests.

Cork trees flourish in Hampton Court Park, where there are two large ones. There are also some ilexes, or evergreen oaks, in Bushy Park, of a very large size, and apparently as hardy as any other tree there. The avenues in that park are perhaps the finest in Europe. There are nine of them altogether, the centre one, formed by two rows of horse-chestnut trees, being the widest. The side avenues, of which there are four on each side of the main avenue, are of lime trees, and the whole length, including the circuit round the Diana water, is one mile and forty yards. The trees are generally in a healthy and thriving state, and when the horse-chestnuts are in full bloom, the appearance of the avenue is most beautiful. The fine fountain in the centre of the circular piece of

over the sacks, from which the water gradually distilled, the mould in the sacks was sufficiently moistened for his purpose. Towards the end of the year he examined the sacks, and found them filled with numerous small fibrous roots, which the sap, having no longer the bark for its conductor into the main roots of the tree, had thus expended itself in throwing out. A hole having been prepared near the spot, the branch was sawn off below the sacks, and planted with them, the branch being propped securely. The next summer it flourished and bore fruit, and is still in a thriving state.

Having heard this fact, I examined the mossy substance on the dog-rose, and found that, in consequence of the bark on the branch on which it was found having been removed by some insect, the sap in receding had thrown out roots, which, from exposure to the air, produced the mossy ball in question, and which was probably made the nest or hybernaculum of some insect *. This idea might be followed up practically in this country, as I have lately heard it is in China; and the more uncertain method of grafting or budding to increase our stock of plants might be abandoned for the method above mentioned.

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* If this mossy substance be examined, the larvæ of an insect will be found belonging to the genus *cynips*. Another species produces the gall-nut; and the birch-tree is subject to a disease, like that in the dog-rose perhaps, and occasioned probably by an insect. The gall-nuts however are very sportive.

> 'Preach as I please, I doubt our curious men
> 'Will choose a pheasant still before a hen.'
>
> HORACE.

ONE of the keepers in Richmond Park informs me that he has often heard his father, who was also a keeper, mention that, in the reign of George the Second, a large flock of wild turkies, consisting of not less than two thousand, was regularly kept up as part of the stock of the park. In the autumn and winter they fed on acorns, of which they must have had an abundant supply, since the park was then almost entirely wooded with oak, with a thick cover of furze; and although at present eleven miles in circumference, it was formerly much larger, and connected with extensive possessions of the Crown, some of which are now alienated. Stacks of barley were also put up in different places in the park for their support; and some of the old turkey cocks are said to have weighed from twenty-five to thirty pounds. They were hunted with dogs, and made to take refuge in a tree, where they were frequently shot by George the Second. I have not been able to learn how long they had been preserved in the park before his reign, but they were totally destroyed towards the latter end of it, in consequence of the dangers to

water in the avenue does not appear to have excited as much attention as it deserves. The small figures and shells are of bronze. The upper part of the fountain is composed of the finest statuary marble, and the figure of Diana on the top, which is seven feet in height, is cast in bronze. The attitude, proportions, and elegance of this figure, cannot be sufficiently admired. The pipes which conveyed the water to play from this fountain, have long since been destroyed, and it is a matter of regret that they have not been replaced.

Near the Queen's house in this park is a very fine Spanish chestnut-tree, said to have been planted by Charles II., and to have been the first which was seen in this country.

The trees in Richmond Park are almost entirely oaks, and some of them of very large dimensions. Many of them however are pollards, in consequence of a custom which formerly prevailed very generally of lopping trees for browse for the deer. Two of the trees are called the 'King and Queen,' and are of very large size. The timber from the trees in this park is generally of a bad quality, probably from the wetness of the soil.

The trees which at present form so much of the beauty of Greenwich Park were planted by Evelyn, and if he could now see them he would call them 'goodly trees,' at least some of them. The chestnuts, however, though they produce some fine fruit, have not thriven in the same proportion with the elms. In noticing this park I should not forget to mention that the only remaining part of the palace of Henry VIII. is preserved in the front of Lord Auckland's house looking into the park. It is a circular delft window of beautiful workmanship, and in a fine state of preservation. There are also a great number of small tumuli in the upper part of the park, all of which appear to have been opened.

Last year a certain portion of the turf in the park became suddenly brown, and the grass withered and died. On turning up the turf, an amazing number of the grubs of the long-legged gnat (*tibula oleracea*) were found, and which had evidently fed on the roots of the grass, as they were eaten off. This shows the correctness of what an intelligent writer, Mr. Stickney, has said in his treatise upon this insect, when he gave it as his opinion that the grub fed on the roots of corn and grass. It has generally been supposed that this grub is most destructive in marshy lands, but the devastation in Greenwich Park was on the high ground near the Observatory, on a bed of gravel. On mentioning the circumstance to one of the governors of Greenwich Hospital, he informed me that a part of one of the estates belonging to the hospital in the north of England had been visited by an army of these destructive insects, who carried on their depredations in a regular line till they came to a river, which stopped their further progress. The mischief done by them in Greenwich Park was stopped by sprinkling salt on the grass, and afterwards dressing it with a slight coat of soil, and sowing grass-seeds upon it. In a note in Messrs. Kirby and Spence's Entomology it is stated that two species of these insects are confounded under the appellation of the *grub*,—the larvæ, namely, of *tibula oleracea* and *cornicina*, which last is very injurious, though not equally with the first. In the rich district of Sunk Island in Holderness, in the spring of 1813, hundreds of acres of pasture have been entirely destroyed by them, being rendered as completely brown as if they had suffered a three months' drought, and destitute of all vegetation, except that of a few thistles. A square foot of the dead turf being dug up, two hundred and ten grubs were counted in it!—and, what furnishes a striking proof of the prolific powers of these insects, the next year it was difficult to find a single one.

In the grounds of the lodge belonging to the Earl of Errol in Richmond Park, there is a raised piece of ground known by the name of Harry the Eighth's Mound. It is supposed that he stood on this elevated spot to watch the signal from the Tower of London, which assured him of the death of Anne Boleyn. It is in a direct line with the Tower, which is readily seen with the naked eye on a clear day. The beauty of the grounds at this charming lodge, with reference to their extent, is exceeded by few in this kingdom.

The upper lodge* in Bushy Park is also very agreeably situated. It was formerly the Ranger's lodge, and in the time of Oliver Cromwell was inhabited by Bradshaw the regicide. Charles II. gave it to a keeper of the name of Podger, who had shown his loyalty during the troubles of the Commonwealth; and he afterwards partook of an entertainment from him at the lodge. On taking down lately the old church at Hampton, Podger's tomb was discovered under the reading-desk. It is now put up in the new church. The original lodge has long since been pulled down, but there is a painting of it preserved in the neighbourhood.

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* Amongst the 'Local Recollections' of Bushy Park, I should not omit to mention the feeling of universal regret in the neighbourhood when her present Majesty quitted it, for greater splendour, certainly, but probably not for greater happiness, than she enjoyed in this charming park. Her quiet, unpretending, yet discriminating charities—her unaffected piety—her cheerful and gracious reception of every one who approached her, whether rich or poor—the delightful manner with which she acknowledged any trifling attentions—will not soon be forgotten by those who had an opportunity of witnessing them. The little gala-days of Bushy House, the visit to see the labourers enjoy their harvest-home supper under a spacious tent in the park, even the cricket-matches and other games of the servants in the field before the house, all these showed a wish to make every one around her happy,—a feeling in which his present Majesty participated. I think I now see the little orphans (there were four of them) of a poor and deserving woman who died in the neighbourhood. They were lodged in the park, and clothed, fed, and educated by the same fostering hand which had relieved so many others. I often met them going to, and returning from, school, looking so neat and clean, so well taken care of, and so happy, that I never saw them without pleasure. That God may bless her, (as he assuredly will,) amidst the troubles and political excitements of the present moment, is the sincere prayer of one who has had very many opportunities of knowing, from the poor and needy, how liberally, and how frequently, she has administered to their wants.—*Note—second edition.*

The footpath from Hampton Wick across Bushy Park to Teddington is particularly pleasant and healthy. A former ranger of the park (Lord Halifax, I believe) attempted to stop this path. A patriotic shoemaker, however, who had long enjoyed an agreeable walk amongst the thorn trees, thought that he could not do better with the money which he had scraped together than leave it to be spent in recovering the right of way for the benefit of his neighbours. The money was accordingly so spent, and the right of way established. Some of the cottagers in the neighbourhood have portraits of this public-spirited cobbler, with an account affixed of the above-mentioned circumstances.

Among the records preserved by the Steward of the Manor of Hampton, is a strong remonstrance from the inhabitants of that place to Oliver Cromwell, complaining of his having encroached upon their rights by adding a part of their common to Bushy Park. This remonstrance seems to have had its effect, as a grant of some land in the neighbourhood was made to them in lieu of what had been taken from them. The ancient boundaries of Bushy Park are found in several places.

In Hampton Court Park may be traced some lines of fortification which were thrown up to teach that art to the Duke of Cumberland, when a boy, and whose name was afterwards so much connected with the troubles of 1745. There is also an unfinished canal, which was begun by William III., and intended to correspond with the one in front of Hampton Court Palace. The spot is still shown where the king's horse slipped, and occasioned his death.

Hampton Court Palace is supplied with water from some springs in Coombe Wood. The distance is two miles, in the most direct line, and the leaden pipes which convey the water are carried across the bottom of the river Thames. There are two pipes from each conduit, making altogether eight miles of leaden pipes. These pipes were laid down by Cardinal Wolsey, for the purpose of supplying his palace with water. A foot of this old lead weighs twenty-four pounds; and allowing one pound for waste in each foot since the time of Cardinal Wolsey, each pipe must have weighed 132,000 pounds, and the eight, therefore, 1,056,000 pounds. This alone is a proof of the amazing wealth and resources of Wolsey. His palace is supposed to have been very considerably larger than the present one, the roof of which is covered with lead, which probably was by no means as plentiful in those days as it is at present.

——' 'Tis often seen
'Adoption strives with nature.'
SHAKSPEARE.

ANIMALS which are unable to associate with their own species will sometimes form most strange attachments. I had last year a solitary pigeon, who, being unable to procure a mate, attached itself to an old barn-door fowl, whose side it seldom left at night, roosting by him in the hen-house. The cock seemed sensible of the attachment of the pigeon, and never molested it, or drove it from him. I had also a tame hedge-hog, which nestled before the fire on the stomach of an old lazy terrier dog, who was much attached to it, and the best understanding existed between them. I have also seen a horse and a pig associate together, for want of any other companions; and Mr. White, in his Natural History of Selborne, mentions a curious fact of a horse and a solitary hen spending much of their time together in an orchard, where they saw no creature but each other. The fowl would approach the quadruped with notes of complacency, rubbing herself gently against his legs; while the horse would look down with satisfaction, and move with the greatest caution and circumspection, lest he should trample on his diminutive companion.

At Aston Hall, in Warwickshire, I remember to have seen a cat and a large fierce bloodhound, who were always together, the cat following the dog about the yard, and never seeming tired of his society. They fed together, and slept in the same kennel.

A gentleman residing in Northumberland assured me that he had a tame fox, who was so much attached to his harriers, and they to him, that they lived together, and that the fox always went out hunting with the pack. This fox was never tied up, and was as tame, playful, and harmless as any dog could be. He hunted with the pack for four years, and was at last killed by an accident.

But a most singular instance of attachment between two animals, whose natures and habits were most opposite, was related to me by a person on whose veracity I can place the greatest reliance. Before he took up his abode at Hampton Court, he had resided for nine years in the American States, where he superintended the execution of some extensive works for the American Government. One of these works consisted in the erection of a beacon in a swamp in one of the rivers, where he caught a young alligator. This animal he made so perfectly tame, that it followed him about the house like a dog, scrambling up the stairs after him, and showing much affection and docility. Its great favourite, however, was a cat, and the friendship was mutual. When the cat was reposing herself before the fire (this was at New York) the alligator would lay himself down, place his head upon the cat, and in this attitude go to sleep. If the cat was absent, the alligator was restless; but he always appeared happy when the cat was near him. The only instance in which he showed any ferocity was in attacking a fox, which was tied up in the yard. Probably, however, the fox resented some playful advances which the other had made, and thus called forth the anger of the alligator. In attacking the fox, he did not make use of his mouth, but beat him with so much severity with his tail, that had not the chain which confined the fox broken, he would probably have killed him. The alligator was fed on raw flesh, and sometimes with milk, for which he showed a great fondness. In cold weather he was shut up in a box, with wool in it; but having been forgotten one frosty night, he was found dead in the morning. This is not, I believe, a solitary instance of amphibia becoming tame, and showing a fondness for those who have been kind to them. Blumenbach mentions that crocodiles have been tamed; and two instances have occurred under my own observation of toads knowing their benefactors, and coming to meet them with considerable alacrity.

Colonel Montagu, in the Supplement to his Ornithological Dictionary, relates the following singular instance of an attachment which took place between a China goose and a pointer who had killed the male. The dog was most severely punished for the misdemeanour, and had the dead bird tied to his neck. The solitary goose became extremely distressed for the loss of her partner and only companion; and probably having been attracted to the dog's kennel by the sight of her dead mate, she seemed determined to persecute the dog by her constant attendance and continual vociferations; but after a little time a strict friendship took place between these incongruous animals. They fed out of the same trough, lived under the same roof, and in the same straw bed kept each other warm; and when the dog was taken to the field, the lamentations of the goose were incessant.

Some animals of the same species form also strong attachments for each other. This was shown in the case of two Hanoverian horses, who had long served together during the peninsular war, in the German brigade of artillery. They had assisted in drawing the same gun, and had been inseparable companions in many battles. One of them was at last killed; and after the engagement the survivor was picqueted as usual, and his food brought to him. He refused, however, to eat, and was constantly turning round his head to look for his companion, sometimes neighing as if to call him. All the care that was bestowed upon him was of no avail. He was surrounded by other horses, but he did not notice them; and he shortly afterwards died, not having once tasted food from the time his former associate was killed. A gentleman who witnessed the circumstance assured me that nothing could be more affecting than the whole demeanour of this poor horse.

'——Where the bee
'Strays diligent, and with th' extracted balm
'Of fragrant woodbine loads his little thigh.'

THOMSON.

I HAVE some experiment hives which enable me very accurately to inspect the operations of my bees. From the construction of the hives, the combs are necessarily built between two panes of glass, so that on drawing the sliders the two surfaces of a comb are exposed to view. In this way I am able to see almost everything that is going forward.

When the queen-bee has an inclination to deposit her eggs, she goes forth, accompanied by six or eight working bees as a guard, whose stomachs are filled with honey. She is very deliberate in her motions, and seems to proceed with great caution. She first looks into a cell, and if she finds it perfectly empty, she draws up her long body, inserts her tail into the cell, and deposits an egg. In this way she slowly proceeds till she has dropped ten or twelve eggs, when perhaps feeling exhausted, she is fed by one of the attendant bees, who have surrounded her the whole time. This is done by the bee ejecting the honey from its stomach into the mouth of the queen. When this has been done the bee goes away, and another takes its place. The operation of laying her eggs again goes on, and is succeeded by the same mode of feeding—the attendant bees frequently touching the antennæ of the queen with their own. When the operation of laying the eggs is completed—and it generally occupies some time—the queen retires to that part of the hive which is most filled with bees. During her progress, the surface of the comb is very little intruded upon, and the space seems purposely to be left unoccupied. Some few of the cells, however, in a brood comb are passed over by the queen, and are afterwards filled either with honey or farina. These serve as deposits of food, from which the neighbouring brood may be fed more readily, as such cells are never covered with wax.

With the hives referred to I have been able to follow many of Huber's experiments, and can bear witness to his general accuracy, except in regard to the fecundation of the queen-bee. I have bestowed much time and pains in endeavouring to discover any of the circumstances he mentions relating to this fact, but without success. Neither have I ever seen a cell visited by one of the drones *after* the egg had been deposited, which a modern writer has asserted they do. I have for many years watched my hives with the greatest care and assiduity, but have never yet seen the queen-bee leave the hive, except at the time of swarming. I have also spoken to several experienced be-emasters on the subject, and they are of the same opinion with myself—that she never quits it. Her person is so easily distinguished from the other bees, by any one at all conversant with them, that if the queen absented herself from the hive, in the way Huber describes her as doing, it seems next to impossible that she should not have been perceived, either on her departure from, or on her return to the hive. And yet we have no English writer on bees (and we have many acute and observant ones) who has even hinted at the probability of the queen's leaving the hive in the manner Huber asserts that she does. It is now many years since his work was published, and no part of it is more curious or more satisfactory, if correct, than what he says of the impregnation of the queen-bee. Curiosity has in consequence been much excited, and many persons, like myself, have been anxious to ascertain the accuracy of his statements. It does not appear, however, that any one in this country has succeeded in doing this, though we have many very patient observers. Is it probable, therefore, that it should have been reserved for Huber alone to ascertain a fact which had escaped the notice of naturalists, not only for ages before, but, what is more important, for years since the publication of it in his work? It should be recollected also that Huber was blind, or nearly so, and that he was obliged to rely very much on the reports made to him by his assistant Burnens. It is however with considerable diffidence that one would venture to doubt the accuracy of any statement of Huber's, especially when the objection turns, not upon a contradictory circumstance, but upon what myself and others *have not been able to discover.*

Wax is a secretion formed under the scales of the back of the insect, from which I have repeatedly seen it exfoliate in small flakes. A considerable degree of heat appears to be necessary to produce this secretion, as I have always observed it most frequent in hot weather. Other writers have maintained that the wax is discharged from the abdominal rings, or segments of the bees. This may be also the case, but I have never perceived it.

The vision of bees seems very imperfect. I have frequently turned a hive, so as to make the entrance about two or three inches from its former position, and have then always found the bees at a loss to gain admittance. Indeed they seem more to *feel* their way than to see it, after they have once landed themselves on the board of their hives. Their progress through the air is always made in a direct line to the hive, and the instinct which enables them to find it, amongst forty or fifty others placed in a row, and nearly similar to each other, is very striking.

Mr. Rogers, in his 'Pleasures of Memory,' has a pretty idea on this subject;—

'The varied scents that charm'd her as she flew,' he thinks might point out the way of her return to the hive.

Wasps appear to have a better vision than bees, though it is not easy to assign a reason for this being the case, since the construction of the eyes of both insects seems to be similar. Derham, in his Physico-theology, has observed in regard to the eye of the bee and wasp, 'that the cornea and optic 'nerves, being always at one and the same distance, 'are fitted only to see distant objects, and not such 'as are very nigh, and that the eye will be found on 'examination to form a curious lattice-work of several 'thousand hexagonal lenses, each having a separate 'optic nerve ministering to it, and, therefore, to be 'considered as a distinct eye.' Wasps, however, certainly seem to alight at the entrance of their nests with more accuracy than bees. I have frequently observed this to be the case, even when the hole of a wasp's nest has been in a grass field, surrounded with long grass. They alight at it with the greatest precision, seldom or never going even half an inch either on one side or the other of it, and they do this even late in the evening.

A hive of bees which have been once much exasperated, do not soon forget the injury. This was the case with one of my hives, the bees of which never allowed me for two years to come near them while they were working, without attacking me, though a neighbouring hive would allow me to take almost any liberties with it with impunity. Indeed I had familiarized myself so much with some of my bees, that I am convinced they knew me, and they always appeared to distinguish me from strangers. By constantly standing before the mouth of the hive, and allowing vast numbers to fly about and settle upon me, and by frequently feeding them, they became so well acquainted with me, that I had much pleasure in witnessing their attachment, and the confidence they placed in me. This affection was mutual, and I always think with pleasure of the many agreeable hours I have passed in company with my bees. Those only can judge of this, who, like myself, have witnessed their assiduity, their internal labours, their affection for their queen, and all the various modes they take in promoting the prosperity of the community. I always listen to the pleasing hum of bees with delight, and know of few sounds more soothing and agreeable.

'Then, cheerful bee, come, freely come,
'And travel round my woodbine bower!
'Delight me with thy wandering hum,
'And rouse me from my musing hour;
'Oh! try no more those tedious fields,
'Come taste the sweets my garden yields:
'The treasures of each blooming mine,
'The bud—the blossom—all are thine.'

In some papers published a few years ago in the 'Plain Englishman,' I endeavoured to point out the great cruelty of procuring honey by the suffocation of bees, and the advantage which the bee-owner would derive from contenting himself with a part only of their stores. This may be done by placing a small hive glass, or even a flower-pot, on the top of each hive in April or May. These should be of a size to hold about eight or ten pounds' weight of honey; and in a tolerably good season they will generally be filled, leaving a sufficient stock of honey for the bees to subsist upon till the following spring. I am happy to find that this method is more generally practised than it formerly was. By adopting it, the lives of thousands of these industrious insects would be saved; the profits of the bee-owner would be much more considerable, and his stock of bees annually increased.

The summer of the year 1818, as I observed before, was unusually dry and hot, and in July flowers of almost every description had entirely disappeared. I observed that bees, in consequence of this, seldom left their hives in search of honey, though the weather, one would have thought, would have tempted them out. They seemed, indeed, to be perfectly aware that their labours would be useless. I recollect meeting with an account of a hive of bees being transported from a distant place, to a spot by the side of a mountain in Italy, where they could procure honey all the year round. Finding this to be the case, they soon gave up stocking their hive, and only went out to collect honey as they wanted it. The same observation has been made on bees taken out from this country to the West Indies, who the first year stored their hive as usual, and never afterwards, merely supplying themselves with food from day to day.

> 'Great injuries these vermin, mice and rats,
> 'Do in the field.'
>
> MORTIMER'S HUSBANDRY.

AN extraordinary instance of the rapid increase of mice, and of the injury they sometimes do, occurred a few years ago in the new plantations made by order of the Crown in Dean Forest, Gloucestershire, and in the New Forest, Hampshire. Soon after the formation of these plantations, a sudden and rapid increase of mice took place in them, which threatened destruction to the whole of the young plants. Vast numbers of these were killed,—the mice having eaten through the roots of five-year-old oaks and chestnuts, generally just below the surface of the ground. Hollies also, which were five and six feet high, were barked round the bottom; and in some instances the mice had crawled up the tree, and were seen feeding on the bark of the upper branches. In the reports made to Government on the subject, it appeared that the roots had been eaten through wherever they obstructed the runs of the mice, but that the bark of the trees constituted their food. This was ascertained by confining a number of the mice in cages, and supplying them with the fresh roots and bark of trees, when it was found that they fed greedily on the latter, and left the roots untouched. Various plans were devised for their destruction: traps were set, poison laid, and cats turned out, but nothing appeared to lessen their number. It was at last suggested, that if holes were dug, into which the mice might be enticed or fall, their destruction might be effected. Holes, therefore, were made, about twenty yards asunder, in some of the Dean Forest plantations, being about twelve in each acre of ground. These holes were from eighteen to twenty inches in depth, and two feet one way by one and a half the other; and they were much wider at the bottom than the top, being excavated or hollowed under, so that the animal, when once in, could not easily get out again. In these holes, at least thirty thousand mice were caught in the course of three or four months, that number having been counted out, and paid for by the proper officers of the forest. It was, however, calculated, that a much greater number of mice than these were taken out of the holes, after being caught, by stoats, weasels, kites, hawks, and owls, and also by crows, magpies, jays, &c. The cats also which had been turned out resorted to these holes to feed upon the mice; and in one instance, a dog was seen greedily eating them. In another, an owl had so gorged himself, that he was secured by one of the keepers. As the mice increased in number, so did the birds of prey, of which at last there were an incredible number. In addition to the quantity above-mentioned, a great many mice were destroyed in traps, by poison, and by animals and birds of prey: so that in Dean Forest alone, the number of those which were killed in various ways could not be calculated at much less than one hundred thousand. In New Forest, from the weekly reports of the deputy surveyor of the forest, about the same number were destroyed, allowing the same calculation for those eaten by vermin, &c.: in addition to which, it should be mentioned that these mice were found to eat each other when their food fell short in winter. Buffon mentions this circumstance, and adds, that they not only devour the smaller of their own species, but also another description of mice, which he calls Campagnols. Putting these circumstances together, the total destruction of mice in the two forests in question would probably amount to more than two hundred thousand. This calculation is made from official weekly returns and other correspondence, and will show the enormous increase of these animals in a few months, as their depredations and destruction were equally sudden.

There were two descriptions of these mice. One of them, called by Buffon *Mulot,* is our long-tailed field-mouse[*]. The other was a short-tailed mouse, and seems to have been the 'Campagnol' of Buffon, from the Italian 'Campagnolo,' or the 'Mulot à courte queue.' There were about fifty of these latter taken to one of the former. The long-tailed mice had all white breasts, and the tail was about the same length as the body. One of them, caught in Haywood Inclosure, Dean Forest, was nearly as large as a weasel, and the back of its neck was beautifully mottled. These latter mice were chiefly caught on the wet greens in the forest, and the short-tailed both on wet as well as dry ground.

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[*] Le Rat à la grande queue; Mus cauda longissima.

The short-tailed mouse has a much thicker head than the long-tailed one, and its ears are very short, and almost hid in the hair. Its body is about three inches long, and the tail one inch. The upper part of the body is of a reddish brown, and the belly a deep ash colour. Their runs and nests are under the surface of the ground. They produce seven and eight, and, in some instances, nine young at a time.

Amongst the birds of prey which made their appearance in Dean Forest during the time the mice were in the greatest numbers, was a small white owl. None of these birds had previously been observed in the forest, but in the space of a few months several were seen, and were considered to be the most destructive of any of the winged enemies of the mice. It was stated in a letter from a gentleman residing in the forest, that under the roost of one of these owls, in an inclosure called Birchwood, there were at least fifty mice, which had passed through the owl *whole*. This assertion was repeated in some subsequent correspondence, though it is probable that the pellets which owls cast up were mistaken for mice. These owls are described as smaller than the brown owl, and as having a kind of ruff round the head.

Specimens of the mice taken in Dean and the New Forest were sent to Sir Joseph Banks, with an account of their depredations. In his answer, he says, 'I 'have received a liberal supply of the mischievous 'vermin. The short-tailed field-mouse of Pennant 'and the field-mouse of the same author are, I be'lieve, the same as those sent; but I am not quite 'certain, because Pennant describes his field-mouse 'as having a tail longer than its body, and the breast 'of an ochre colour. But those that I received have 'their tails of the same length as the body—the 'breast white. I incline to conclude that they are 'young animals, and that the old ones will answer 'Pennant's description.

'I trust that it will be ascertained which of the 'animals is the enemy to planting that is complained 'of. The proportionate quantities of each will be 'an object also of inquiry.

'I shall be glad to receive an account of the mis'chief the mice have done. I have not in any work 'met with an account of mice having been accused 'of barking trees, which makes the fact a valuable 'addition, not only to natural history, but useful to 'all planters, who, when they are made aware of 'the nature of the obstacles presented to them, will 'have a better chance than otherwise would be the 'case of discovering a remedy.

'In speaking of shrew-mice, Pennant tells us that 'the root of the white hellebore and staves-acre * 'mixed with meal is a certain poison for them. If 'so, it may be well to attempt by the same means 'to destroy these enemies.'

In a subsequent letter Sir Joseph Banks says, 'On talking over the subject of the mice with a 'very intelligent practical man, he suggested an idea 'that the evil of young plants being barked by mice 'may be much more prevalent than we suppose it 'to be, though attributed to the teeth of rabbits and 'hares, instead of mice. He mentioned a wood of 'mine in Derbyshire, where abundance of young 'trees were planted, and the whole destroyed by 'rabbits, as my steward and himself supposed. Also 'much mischief in the woods of Lord Vernon at 'Sudbury. In both these cases the trees were never 'barked higher than about six inches from the 'ground—as high as a mouse can reach; but a rab-'bit can as easily bark a tree a foot from the ground 'as an inch.

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* A kind of larkspur.

In answer to this suggestion it may be stated, that there were no rabbits and very few hares in the inclosures in Dean Forest, so that the damage done to the plants could not have been occasioned by them. Besides, several of the forest woodmen and others attested that they had frequently seen the mice in the act of barking the trees, even at the height of three and four feet from the ground, having climbed up the trees to that distance.

In another letter from Sir Joseph Banks, he says, 'I have inquired far and near, and I cannot meet 'with any who has suffered by the barking of young 'trees who attributes the mischief to mice. The 'discovery, therefore, must prove advantageous to all 'planters.'

In one of the Dean Forest inclosures many old hollies had been cut down to clear the way for the plantations; and from them bushes consisting of many young shoots had grown up. Almost all of these in one month of the year (September) were observed to be in a state of greater or less decay, some quite black, some turning yellow, whilst a few still remained green. Upon inspecting them it was found that the bark had been gnawed off more or less, and more or less recently according to the gradations of decay. The mice, however, barked indifferently young oaks, ash, beech, hollies, and willows, and but very few of the fir tribe.

In the pits made for catching the mice, they exhausted themselves in efforts to climb up the sides, so that by far the greater number of them were taken out dead. Many were drowned where the water partly filled the holes; but so little did they dread water, that ash was seen fresh barked, the bottom of which was surrounded with water in such a way, that one of the officers of the forest asserted, in an official report, that the mouse must have been actually swimming at the time of barking it. In the same report he also mentions his belief that the weasels, at the time they are preying on mice, swallow them whole, and that what they cannot digest, as the fur, &c., they void from their mouths in balls afterwards; so that it is scarcely ever perceptible where they have eaten their prey. In one of the retreats of a weasel ten mice were found; and another weasel was seen to run into its hole with a mouse in its mouth. It is probable, however, that they were brought there as food for the young. The weasel, I believe, generally sucks the blood of its prey, at least that of the larger animals.

It should be mentioned in conclusion that, in a plantation in Dean Forest, consisting of three hundred acres, not more than four or five plants were found which were not injured by the mice or indeed destroyed by them. Many of the plants bitten through were as thick as a man's arm; and the roots were gnawed so close to the stem, that some of the young trees were seen either reclining on one side, or level with the ground.

The following account will show the numbers of mice caught in the different inclosures in Dean Forest in three months, from September to January, with the number of acres, and the proportion between the long and the short tailed mice.

	Acres.	Short-tailed Mice.	Long-tailed Mice.	Total.
Haywood Inclosure	418	12,850	8	12,858
Oiley Hill ditto	41	1,161	11	1,172
Crabtree Hill ditto	372	7,851		7,851
Park Hill ditto	113	2,665		2,665
Shutcastle ditto	163	484	33	517
Sallow Vallets ditto	386	1,361		1,361
Barnhill ditto	50		70	70
Birchwood ditto	50		3	3
Whitemead Park ditto	100	1,559	15	1,574
	Total Acres, 1,693			Total Mice, 28,071

I should not forget to mention that, in New Forest, foxes were frequently seen hunting after the mice, and eating them greedily.

I was lately shown a pear-tree, trained against an out-house in the yard of a gentleman at Hampton-Court, all the upper part of which had been eaten away by rats. They descended from the projecting eaves of the building on the branches of the pear-tree; and as far as they could reach had fed on the leaves and tender shoots of the drive him away with their horns. So severe is the chase in Richmond Park in taking deer, especially when the ground is wet, that three or four good horses may be tired by a single horseman in one day's deer taking, if each deer is ridden out of the herd, and followed till he is taken. When dogs are in slips, the man who holds them merely rides as near as he can to the person who is endeavouring to single out the deer, and awaits his signal for slipping the dog. These dogs, who are a large, rough sort of greyhound, and very powerful and sagacious, are soon taught not to injure the deer when they come to them. The cry of 'Hold them,' made use of by the keepers in urging them forward, seems to be perfectly understood by the dogs.

The days for taking deer in Richmond Park are kept as secret as possible, in order to prevent too great a concourse of people. I have, however, frequently witnessed it, and know of few sights more animating and interesting.

The keepers in some of the king's parks have a method of taking hares alive, which I never saw practised elsewhere. When they want to lessen the number of male hares, they look for a hare in its form, and when found, they ride round it in a circle. They continue to do this for some time; and if the hare keeps her seat, two men walk up on each side of her, holding a net spread out between them. At a given signal, they drop it, and the hare is caught. If it is a female, it is again turned loose.

Hares will try and find each other by the scent, as we see dogs hunt. I have disturbed a hare from her seat in the spring during the breeding season, and when I have retired to a little distance, I have seen her followed, when she was no longer in sight, by a male. He has evidently traced her by the scent; and when he has been at fault, I have observed him make a cast, and hunt his ground as a dog would do, till he has again hit off the right way, and followed with the greatest eagerness. I have been assured by a person who witnessed it, that six or seven weasels have joined together, and have pursued a rabbit by the scent, not exactly in full cry, but uttering a sort of whine while they were in pursuit.

Where the soil and herbage agree with hares, they increase with amazing rapidity. In Hampton Court Park, where they have no shelter, and where many leverets are destroyed, in consequence of horses and cows trampling upon them, they thrive, nevertheless, better than in any place I am acquainted with. In coursing them, they run nearly, if not quite, as strong as down hares. As there is no cover for them to retreat to, they take refuge, but only when hard pressed, either in old rabbit holes, or in drains, and holes in trees. I have observed in coursing, that if a hare, when she is started from her form, has her ears down, she is a weak runner, but if was named ‘Sir Edmund,’ by his late Majesty, in consequence of Sir Edmund Nagle having been in at the ‘*take*’ after a long chase. This stag lived some years afterwards in the park; and it is a curious fact that he died the very same day on which Sir Edmund Nagle died. This deer herded with the cows, probably from having been so long separated from his usual companions.

Does are longer lived than bucks. One doe in Richmond Park lived to be twenty years old; and there are other instances of their having attained the same age.

A curious circumstance lately occurred, respecting the red deer in the park in question. In the year 1825, not a single calf was dropped by any of the hinds, though they had bred freely the preceding, and did the same in the subsequent year. I find an event recorded in the ‘Journal of a Naturalist,’ as having happened in the same year in regard to cows. It is there stated that, for many miles round the residence of the author, scarcely any female calves were born. This diminution of the usual breed of deer, and the increase of sex in another animal, is not a little remarkable.

There is a fine breed of buck-hounds in Richmond Park, and their sagacity is very extraordinary. In taking the deer, according to annual custom, either for the royal hunt or for the fattening paddocks, a stag or a buck, which has been previously fixed upon, is ridden out of the herd by two or three of the keepers in succession, each of whom is closely followed by a hound, the young dogs only being kept in slips. As soon as the deer has been separated from his companions, the dogs have the requisite signal given to them, and they immediately follow in pursuit. The scene is then highly interesting. A strong deer will afford a very long chase, but when he comes to bay, the dogs generally seize him by the throat or ears; the keepers come up, take him by the horns, and after having strapped his hind and fore legs together, put him into a cart which follows for the purpose, and he is then disposed of as he may be wanted. I have seen an active young keeper throw himself from his horse upon a deer at bay, which he had come up to at full gallop, and hold his horns till assistance arrived. Some danger, however, attends this sport; as, when a deer has been hard pressed, I have seen him, in more than one instance, suddenly turn upon the horsemen and injure the horses, and in one case wound the leg of the horseman. The dogs are so well trained, and are so soon made aware which buck is intended to be caught, that they seldom make a mistake, even if the deer regains the herd after having been driven from it, but press him through it, till they have again separated him from it. It is well known that when a hard-pressed deer tries to rejoin his companions, they endeavour to avoid and get away from him as much as possible, or try to taken to one of the former. The long-tailed mice had all white breasts, and the tail was about the same length as the body. One of them, caught in Haywood Inclosure, Dean Forest, was nearly as large as a weasel, and the back of its neck was beautifully mottled. These latter mice were chiefly caught on the wet greens in the forest, and the short-tailed both on wet as well as dry ground.

The short-tailed mouse has a much thicker head than the long-tailed one, and its ears are very short, and almost hid in the hair. Its body is about three inches long, and the tail one inch. The upper part of the body is of a reddish brown, and the belly a deep ash colour. Their runs and nests are under the surface of the ground. They produce seven and eight, and, in some instances, nine young at a time.

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This is one of those mysteries in nature which it is not easy to account for. We find that a bird, as soon as it has deposited four eggs in its nest, as in the case of the lapwing, immediately ceases to produce any more; but if disturbed in its arrangements, will go on to lay perhaps five times that number, and yet cease the moment it has collected its usual number for hatching in the same spot. This property does not seem to belong to our domestic fowls. A hen, when she wants to sit, will as readily do so upon one egg as more, and so will a turkey. This latter bird is of a very torpid nature, and will continue to sit for many months together, on a very scanty supply of food. The persons who breed very early poultry for the London market, have a secret for preserving the vital property in eggs laid in the spring and summer till late in the autumn, when they are put under turkeys who have been kept sitting, and are hatched early in the winter. These persons chiefly reside near Chertsey, in Surrey, and the neighbouring country; and the secret for preserving the eggs in a proper state for hatching is strictly preserved amongst them. I have visited one of their cottages, and found the only room surrounded with small square pens, in which the turkeys were sitting. They are occasionally taken off the nest for a short time, and then returned to it.

It appears difficult to assign a reason why birds of the same size and species should produce eggs of a different shape and colour. The hedge-sparrow's egg is blue; while that of the robin, who lives on the same sort of food, and is like it in various particulars, produces an egg of a darkish brown and white colour, ornamented with yellowish brown spots. The cormorant has pale green eggs, while the egg of the gannet is white: both these birds feed on fish. The eggs of the rook, magpie, and lapwing, are nearly similar in size and appearance. Those of the pigeon, owl, and kingfisher, are white; and those of the blackbird of a bluish green. In like manner, the eggs of the land tortoise are of a dusky, brownish white; and those of the crocodile of a bluish white. Even hens in the same poultry-yard, and fed on the same food, produce eggs of a different colour, some being much darker than others. I have also observed that some ducks of the same breed have white eggs, and others bluish ones. Hens sometimes produce eggs with a double yolk in them, and others have been found with a double shell. It is a curious and interesting fact, that the spot on the upper surface of the yolk of an egg, being that in which the future chick is placed, is so much lighter than the opposite side, that in whatever position the egg is placed, this part is always opposed to the belly of the incubating bird*.

Another wonderful fact respecting eggs is that some birds have the property of either retaining their egg after it has arrived at maturity, or of suppressing altogether the further progress of those eggs which had arrived at a certain size in the ovarium. I have on several occasions purchased pullets for my farm-yard which had just begun to lay. Perhaps on their way to their new home they would drop one egg in the basket in which they were confined; but I have invariably found that, on arriving at a strange place, they have altogether ceased to lay any more eggs till they had become habituated to their companions, and had made themselves acquainted with the localities of their new situation. We know, on opening a pullet who has just begun to lay, that there is a regular succession of eggs of different sizes in the ovarium. Some are nearly complete, others are as large as a marble, and others of the size of a pea. The circumstance of birds being endowed with the extraordinary property of preventing the eggs from arriving at maturity, when their usual habits or place of abode have been changed, is one of those facts in natural history on which little light has yet been thrown. If the leg of a pullet is broken after she has laid two or three eggs, we find that as long as there is a necessity for the formation of new bone, she will perhaps drop one without a shell, and then cease altogether from laying any more till the bones of her leg are knit, and the union is complete. She then begins to lay again, but the number is regulated by those she had previously laid. Suppose, for instance, that she had laid four eggs before her leg was broken, and that the quantity in her ovarium when she first began was sixteen, she would, when she resumed her laying, only produce the remaining twelve. From this it is clear that a certain quantity of some material—lime and chalk probably—is necessary to enable a hen to produce a perfect egg, and that the want of it retards the process going on in the ovarium, without producing any immediate injury to those eggs which were in a gradual process towards maturity. In the instance already mentioned of hens ceasing to lay on being brought to a strange place, it was probably occasioned by their restlessness, and not knowing at first where to go in search of what was necessary to enable them to bring their eggs to perfection.

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* Blumenbach.

'Prythee do not value thyself on thy reason at that exorbitant 'rate, and the dignity of human nature; take my word for it, a 'setting-dog has as good reason as any man in England.'

SPECTATOR.

THE captain of a trading vessel, who now resides at Brighton, picked up lately a dog at sea, more than twenty miles from land. This circumstance may throw some light on the fact of dogs, which have been sent to France or Ireland from England, finding their way back. The present Earl of L—— sent some drafted hounds from his kennel in Cumberland to Ireland, where they were safely received, and a receipt given for them to the person who brought them over. Three weeks afterwards two of these hounds made their appearance at Lord L.'s kennel, though in a very exhausted state. A gentleman also informed me that a pointer-dog which had been left at Calais made its way over to England. The most amusing fact of this kind that I know of is one that was related to me by a gentleman on whose veracity I can place most implicit reliance; and though it may appear to some of my readers to border upon the marvellous, I think it too entertaining to withhold it. He informed me that a friend of his, an officer in the Forty-fourth Regiment, who had occasion, when in Paris, to pass one of the bridges across the Seine, had his boots, which had been previously well polished, dirtied by a poodle-dog rubbing against them. He in consequence went to one of the men stationed at the corner of every street in Paris and on the bridges, and had them cleaned. The same circumstance having occurred more than once, his curiosity was excited, and he watched the dog. He saw him roll himself in the mud of the river, and then watch for a person with well-polished boots, against which he contrived to rub himself. Finding that the shoeblack was the owner of the dog, he taxed him with the artifice; and after a little hesitation he confessed that he had taught the dog the trick in order to procure customers for himself. The officer, being much struck with the dog's sagacity, purchased him at a high price, and brought him to England. He kept him tied up in London some time, and then released him. The dog remained with him a day or two, and then made his escape. A fortnight afterwards he was found with his former master, pursuing his old trade on the bridge.

Nor is a dog the only animal who has shown an extraordinary faculty in finding his way home. The following anecdote was related to me by Edward Hawke Locker, Esq., one of the Governors of Greenwich Hospital, the circumstance having happened while he was in the Mediterranean. It is also mentioned in a note in Messrs. Kirby and Spence's Entomology, who state that they had it from Lieutenant Alderson of the Royal Engineers, who was personally acquainted with the facts.

In March, 1816, an ass, the property of Captain Dundas, R.N., then at Malta, was shipped on board the Ister frigate, Captain Forest, bound from Gibraltar for that island. The vessel having struck on some sands off the Point de Gat, at some distance from the shore, the ass was thrown overboard, to give it a chance of swimming to land—a poor one, for the sea was running so high, that a boat which left the ship was lost. A few days afterwards, however, when the gates of Gibraltar were opened in the morning, the ass presented himself for admission, and proceeded to the stable of Mr. Weeks, a merchant, which he had formerly occupied, to the no small surprise of that gentleman, who imagined that, from some accident, the animal had never been shipped on board the Ister. On the return of this vessel to repair, however, the mystery was explained; and it turned out that Valiante (so the ass was called) had not only swum safely to shore, but without guide, compass, or travelling-map, had found his way from Point de Gat to Gibraltar, a distance of more than two hundred miles, which he had never traversed before, through a mountainous and intricate country, intersected by streams, and in so short a period that he could not have made one false turn. His not having been stopped on the road was attributed to the circumstance of his having been formerly used to whip criminals upon, which was indicated to the peasants, who have a superstitious horror of such asses, by the holes in his ears, to which the persons flogged were tied.

I have also been assured that a favourite cat belonging to a nobleman, which had been conveyed to his country-seat more than a hundred miles from London, found her way back to his house in town. Nothing can be more extraordinary than the way in which bees find their way back to their hive. Place it amongst hundreds of others, exactly similar in outward appearance, or at the top of a house in London *, or concealed in the thickest wood, and the bee will regain it without the slightest apparent difficulty. Huber says they fly to it with an extreme rapidity, and as straight as a ball from a musket. Nothing can show more forcibly the wonderful instinct which has been given to these insects by Almighty God. If they experienced any difficulty in finding their homes, how much time would be lost, and how inadequate would all their labours and industry be, to furnish a sufficient store of honey to exist upon during the winter! I have always observed that when a fresh hive has been brought to my garden from a distant place, the bees employ themselves, on first leaving it, not in collecting honey, but in making themselves acquainted with all the

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* I was shown a fine glass of honey taken from a hive of bees placed on the top of a house in Harley-street.

neighbouring objects, and these objects may possibly serve to guide them to their respective homes. Some naturalists are of opinion that this recognition of home is the result of memory. Perhaps in some instances it is so, but memory could not have guided an ass over two hundred miles of country, which he had never passed before; and the same unexplained instinct which brought him back to his stable at Gibraltar, may guide the bee to his hive.

This instinctive sagacity, which guides animals who have been taken from their old haunts, in making their way back to them, appears in some to whom we should have been less disposed to attribute it. I have an anecdote from a gentleman, who resided some years on an estate high up the Susquehannah, of some pigs, which, having been brought in a sack fifteen miles through an American wood, by the next morning had found their way back, from their new to their old home. I have also been assured that Welsh sheep have been known to find their way back, from the neighbourhood of London, to their native mountains. It is no uncommon thing for dogs who have been taken a great distance in carriages, to make their way home again, and that in a very short space of time. A friend of mine took a pointer dog in his carriage, to some shooting ground in Scotland, more than a hundred miles from his house. Upon receiving some correction from his master, he left him, and made his way back to his kennel.

Some animals, when placed in particular situations, seem to lose sight of their natural propensities. A cat belonging to a miller of the name of Hook, near Fakenham, in Norfolk, had been so much accustomed to the sight of water, that she seemed to have lost all dread of it, and would dive into deep water after fish. This was not done in one or two instances only, but was almost a daily practice. Dr. Darwin has related a similar circumstance of a cat who caught trout at a mill near Lichfield.

A friend of mine had a poodle-dog possessed of more than ordinary sagacity, but he was, however, under little command. In order to keep him in better order, my friend purchased a small whip, with which he corrected the dog once or twice during a walk. On his return the whip was put on a table in the hall, and the next morning it was missing. It was soon afterwards found concealed in an outbuilding, and again made use of in correcting the dog. It was, however, again lost, but found hidden in another place. On watching the dog, who was suspected of being the culprit, he was seen to take the whip from the hall-table, and run away with it, in order again to hide it. The late James Cumming, Esq., was the owner of the dog, and related this anecdote to me. Let me here pay my little tribute of affection to his memory. He was one of my oldest friends, and those who knew and loved him as I did, will join with me in opinion, that, in addition to fine sense, and indefatigable research, (of which he gave a proof in his very able reports on the Revenue of India,) he was possessed of the kindest heart, and the most agreeable manners and conversation. His early death was deplored by numerous friends, amongst whom were many men of high rank and great talents.

> 'As that ungentle gull, the cuckoo's bird,
> 'Useth the sparrow.'
>
> SHAKSPEARE.

PERHAPS few birds have excited more curiosity amongst naturalists than the cuckoo, and some rather contradictory accounts have from time to time been published respecting them. Dr. Jenner was the first who threw any light on the natural history of this extraordinary bird; and his account is most interesting and satisfactory. The fact of the young cuckoo turning out its weaker companions, the natural inmates of the nest, is now undisputed. This operation is, I believe, generally performed on the second day after the birds are hatched,—at least, I have found it to be so in the cases which have come under my own observation. The young intruder seems to confine his dislike to his nestling companions to the act of discharging them from the nest. In one instance, which I had an opportunity of observing, the young birds, which had only been hatched two days, were so little hurt by a fall of four feet from the nest to the ground, that two of them contrived to crawl a distance of eight or nine feet from the place on which they had fallen. Sometimes the young cuckoo is hatched before the other birds: in which case he proceeds to discard the eggs, which he is enabled to do by means of a depression in the middle of his back. It seems, however, to have escaped the notice of those to whom we are most indebted for the agreeable information we already possess of the habits of the cuckoo, that the parent bird, in depositing her egg, will sometimes undertake the task of removing the eggs of those birds in whose nest she is pleased to place her own*. I say sometimes, because I am aware that it is not always the case; and indeed I have only one fact to bring forward in support of the assertion: it is, however, connected with another relating to the cuckoo, not a little curious. The circumstance occurred at Arbury, in Warwickshire, the seat of Francis Newdigate, Esq., and was witnessed by several persons residing in his house. The particulars were written down at the time by a lady, who bestowed much time in watching the young cuckoo, and I now give them in her own words:—' In the early part of the summer of 1828, ' a cuckoo, having previously turned out the eggs ' from a water-wagtail's nest, which was built in a ' small hole in a garden-wall at Arbury, deposited

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* May she not do this in consequence of not being able to find a nest fit for her purpose, and therefore, from some extraordinary and powerful instinct, she removes eggs which would be hatched before her own, and the young birds from which might become too strong and heavy to be ejected from the nest by the young cuckoo? It requires all the exertions and activity of a pair of water-wagtails or hedge-sparrows to provide for a young cuckoo. If there were other birds in the nest, some must starve. The female cuckoo, by ejecting the eggs, prevents this.

'her own egg in their place. When the egg was 'hatched, the young intruder was fed by the water-'wagtails till he became too bulky for his confined 'and narrow quarters, and in a fidgety fit he fell to 'the ground. In this predicament he was found by 'the gardener, who picked him up, and put him 'into a wire-cage, which was placed on the top of a 'wall, not far from the place of its birth. Here it 'was expected that the wagtails would have followed 'their supposititious offspring with food, to support it 'in its imprisonment—a mode of proceeding which 'would have had nothing very uncommon to recom-'mend it to notice. But the odd part of the story 'is, that the bird which hatched the cuckoo never 'came near it; but her place was supplied by a 'hedge-sparrow, who performed her part diligently 'and punctually, by bringing food at very short in-'tervals from morning till evening, till its uncouth 'foster-child grew large, and became full feathered, 'when it was suffered to escape, and was seen no 'more: gone, perhaps, to the country to which he 'migrates, to tell his kindred cuckoos (if he was 'as ungrateful as he was ugly when I saw him in 'the nest) what fools hedge-sparrows and water-'wagtails are in England. It may possibly be sug-'gested, that a mistake has been made with regard 'to the sort of bird which hatched the cuckoo, and 'that the same bird which fed it, namely, the 'hedge-sparrow *, hatched the egg. If this had 'been the case, there would have been nothing ex'traordinary in the circumstance; but the wagtail 'was too often seen on her nest, both before the 'egg was hatched, and afterwards feeding the young 'bird, to leave room for any scepticism on that point; 'and the sparrow was seen feeding it in the cage 'afterwards by many members of the family daily.'

This account (the accuracy of which no one can doubt, who is acquainted with the party from whom it comes) seems to prove the assertion which some persons have made, of cuckoos having introduced their eggs into the nest of the wren, or into nests built in holes in the wall; or, as Dr. Jenner asserts, in a wagtail's nest in a hole under the eave of a cottage. Some doubt has been thrown on the accuracy of this statement of Dr. Jenner's, in a new and very agreeable edition of Colonel Montague's Ornithological Dictionary: at least, a hint is given that it was rather a singular place for a wagtail to build in. I have, however, found them in similar situations; and one wagtail built amongst the rough bricks which formed some rock-work in my garden. If the fact, therefore, is undoubted, that the egg of the cuckoo is found in the nest of a bird built in so small a hole in a wall that a young cuckoo could

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* It could not have been the hedge-sparrow, as they are never known to build in a hole in a wall.

no longer remain in it, by what means could she contrive to introduce her egg into the nest? It appears quite impossible that she could have sat on the nest while she deposited her egg; and it is not easy, therefore, to form a probable conjecture how the operation was performed. Spurzheim, however, asserts in his Lectures, that he actually saw an instance of a cuckoo having dropped her egg near a nest so placed that she could not possibly gain admittance to it; and that after removing the eggs which were already in the nest, she took up her own egg in one of her feet, and in that way placed it in it.

'—— Hark! what loud shouts
'Re-echo through the groves! he breaks away:
'Shrill horns proclaim his flight.'—Somerville.

Some curious instances have been related to me of the cunning evinced by foxes, not only in the preservation of their lives, but in procuring themselves food. A fox, which had been frequently hunted in Leicestershire, was always lost at a particular place, where the hounds could never recover the scent. This circumstance having excited some curiosity, it was at last discovered that he jumped upon, and ran along a clipped hedge, at the end of which was an old pollard oak tree, hollow in the middle. He crept into this hollow, and lay concealed till the alarm was over. His retreat, however, being discovered, he was driven from it and killed. Another fox selected a magpie's nest as a place of retreat, and was discovered in consequence of a labouring man having observed a quantity of bones, feathers of birds, &c., on the ground under the nest. The following fact may be relied upon, extraordinary as it may appear. I received it from a gentleman of the strictest veracity, who communicated it to me very recently, on his return from the south of France, where he had been residing for some months. A friend of his, with whom he passed much of his time there, was in the habit of shooting in a part of the country where there was much wild and rocky ground. Part of this rocky ground was on the side of a very high hill, which was not accessible for a sportsman, and from which both hares and foxes took their way in the evening to the plain below. There were two channels or gullies made by the rains, leading from these rocks to the lower ground. Near one of these channels, the sportsman in question, and his attendant, stationed themselves one evening, in hopes of being able to shoot some hares. They had not been there long, when they observed a fox coming down the gully, and followed by another. After playing together for a little time, one of the foxes concealed himself under a large stone or rock, which was at the bottom of the channel, and the other returned to the rocks. He soon, however, came back, chasing a hare before him. As the hare was passing the stone where the first fox had concealed himself, he tried to seize her by a sudden spring, but missed his aim. The chasing fox then came up, and finding that his expected prey had escaped, through the want of skill in his associate, he fell upon him, and they both fought with so much animosity, that the parties who had been watching their proceedings came up and destroyed them both.

Pontoppidan informs us, that when a fox observes an otter go into the water to fish, he will frequently hide himself behind a stone; and when the otter comes to shore with his prey, will make such a spring upon him, that the affrighted animal runs off, and leaves his booty behind. Mr. Bingley quotes this anecdote, but without giving much credit to it.

In Smith's Directory for destroying vermin, we find it said that the fox exhibits a great degree of cunning in digging young rabbits out of their burrows. He does not try to enter the hole; for in this case he would not only have to enlarge it, but have also to dig several feet along the ground, under the surface of the earth; but he follows their scent above, till he comes to the end, where they lie; and then scratching up the earth, descends immediately upon and devours them.

Buffon considered that the fox ought to be placed amongst the higher order of quadrupeds, from the great care and dexterity they show in the construction of their habitations. Some of them are placed in extraordinary situations, a fox having been known to let himself drop from the edge of a precipice on a projecting piece of rock just below it, from which he got into his hole or den. These dens are sometimes provided with outlets, by which the fox may effect his escape.

Buffon says that foxes are so fond of honey, that they will sometimes attack bee-hives, and even the nests of wasps, for the sake of what they can find to eat; and that they frequently meet with so rough a reception as to be obliged to roll themselves on the ground, to get rid of the insects that are stinging them. They then, he says, return to the charge, and generally succeed in securing the combs. I have, however, kept bees where there were many foxes in the neighbourhood, who could have gained access to my hives without any difficulty. I never had any reason to suspect that they in any way molested them, nor did it ever fall in my way to hear an instance of this having happened in this country.

'The poor fish have enemies enough, besides such unnatural 'fishermen as otters, the cormorant, and the bittern.'
WALTON'S ANGLER.

I WENT lately to see a fine heronry at Sir Henry Fletcher's park, Walton-on-Thames. The nests are built on the top of some of the finest fir-trees in the kingdom, and appear somewhat larger than those of the rook. These birds must go an amazing distance to provide food for their young, as I have been assured that the bones of sea-fish have been found under the nests. They appear to be slow and heavy fliers.

A young bird from this heronry having fallen out of the nest, was taken away in the evening by a gentleman, who carried it to his house at some miles distance, and turned it into a walled garden that night. The next morning, one of the old birds was seen to feed it, and continued to do so till the young one made its escape. This bird must have gone over a very considerable space of ground in search of the young heron.

A large assembly of herons takes place at certain times of the year in Richmond Park, where I have counted from fifty to sixty at a time. Sometimes they may be seen on the tops of trees, and at others on the ground at a distance from the ponds, appearing perfectly motionless till they are disturbed. This assemblage is very curious. The nearest heronry from Richmond Park is the one near Walton-on-Thames, and the other in Windsor Great Park, both of which would scarcely furnish the number above mentioned. There seems to be no reason why they should congregate and remain for so long a time in the listless manner in which I have seen them; nor can one give a probable reason why the birds from two heronries should meet at the same time in a place so far distant from their usual haunts. It is seldom that one sees more than two or three herons together in the same place, and then only when they are watching for their prey.

A bittern (*ardea stellaris*) was lately shot by one of the keepers in Richmond Park. Though nearly dead when he was going to pick it up, it showed considerable ferocity.

From the scarcity of this bird in England, few people are acquainted with the dismal noise it sometimes makes. Mr. Rennie describes it in a very picturesque manner.

'Those,' he says, 'who have walked in a sum-
'mer's evening by the sedgy sides of unfrequented
'rivers must remember a variety of notes from differ-
'ent water-fowl; the loud scream of the wild goose,
'the croaking of the mallard, the whining of the
'lapwing, and the tremulous neighing of the jack-
'snipe. But of all these sounds there is none so

'dismally hollow as the booming of the bittern. It 'is like the interrupted bellowing of a bull, but hol-'lower and louder, and is heard at a mile distance, 'as if issuing from some formidable being that re-'sided at the bottom of the waters. This is the 'bittern, whose windpipe is fitted to produce the 'sound for which it is remarkable. These bellowing 'explosions are chiefly heard from the beginning of 'spring to the end of autumn; and are the usual 'calls during the pairing season.'

'At evening, o'er the swampy plain,
'The bittern's boom came far.'

I have been informed by keepers that, if they wound a bittern, it requires great caution in taking it up, as it will frequently dart its pointed beak at their faces, and it always makes a vigorous resistance. Mr. Bingley says that this bird will wound the leg of the sportsman even through his boot; and that it sometimes turns on its back, and, like the rapacious birds, will fight with both its bill and its claws. When surprised by a dog, it is said always to throw itself into this posture.

Living near the Thames, some of my kind neighbours, knowing my fondness for collecting specimens of natural history, frequently send me aquatic birds which have been shot on that river during a hard winter. I have had some rather rare ducks sents me;

and a grebe or two. The latter make their appearance in greater or less numbers about us every winter. Some wild swans were also shot last winter. I sent two fine specimens of the male and female mergus to the Zoological Museum. The male bird was a rare and beautiful specimen, the person who stuffed it having informed me that he only knew of one other like it in any of the collections in the metropolis. It is to be regretted that those who accidentally procure a scarce bird do not present it to those disinterested friends of science, the Zoological Society. It would be the means of enriching their already valuable museum, and thus extend its utility and agreeable resources for the benefit of all lovers of natural history.

——'Tread softly, that the blind mole may not
'Hear a foot fall; *we now are near his cell.'*
SHAKSPEARE.

THE mole-hills which we see in fields and meadows are thrown up by the mole probably during its search for food. Little was known of the natural history of this animal, till a French naturalist, M. St. Hilaire, published lately some interesting particulars respecting it. The mole forms several underground passages; and the way she proceeds in doing this is as follows:—she first makes a *run* in various directions, by undermining the ground, and unites this and several others at one point, making, however, some of them larger than the others. M. St. Hilaire says that she finishes by arranging them with the most perfect symmetry, plastering the sides with great care; and when completed it may be called her *encampment*. In the centre of these works she establishes herself, and appropriates a separate place to the reception of her young, whic is in some respects differently constructed from her own. In order to render the respective habitations which she and her young occupy not liable to be injured by the rain, she makes them almost even with the ground, and higher up than the runs, which serve as drains, or channels, to carry off the water. She makes choice of the place of her abode with the greatest care, sometimes constructing it at the foot of a wall, or near a hedge or a tree, where it has the less chance of being broken in. This abode is sometimes protected by having a quantity of earth thrown over it, especially in light soils, where I have seen a mound almost large enough to fill a wheelbarrow. Sometimes, however, no earth is thrown up over the habitation. This precaution of the mole is very necessary, to prevent the places she has chosen for retreats for herself and her young from being trampled in. When a mole has occasion to make her run through a gateway, I have observed that she generally carries it as near as possible to the gate-post, where it is less likely to be injured. Some runs are so near the surface, that I have seen the ground crack during the animal's progress in working them. The bed for the young is composed of the blades of wheat, with which the mole forms a sort of mattress. Four hundred and two of them were counted in one nest, and all so fresh in their appearance, that they had been probably collected by this little animal in the course of two or three days. This shows not only her extraordinary industry, but the great depredation she must commit.

The mole is never known to work for food near the place which she has fixed upon for her abode. She labours to procure it about two hours in the morning, and as many in the evening, and then returns to her home or resting-place, which is so constructed, that she is instantly made aware of any danger. This effect is produced by forming the upper runs in a sort of circle, so as to communicate a vibration when anything passes over them. The mole then takes alarm, and escapes by one of her *safety* runs.

The mole is not often seen on the surface of the earth. I once, however, caught one, and turned it loose upon a lawn, the turf of which was on a bed of strong gravel, and particularly hard and dry. Notwithstanding these disadvantages, the mole contrived to bury itself almost in an instant, working into the earth by means of her snout and fins (for they can hardly be called feet) so fast, that the ground seemed to yield to her mere pressure.

The power of smelling in the mole is very acute; and it is supposed that this sense serves to direct her in the search of her food. She hunts after beetles and worms, which last she pursues eagerly, but not always successfully; for the earth-worm is aware of its danger, and quick in escaping from it. Her search for prey taking place in the morning and evening, when birds are more generally on their feed, must be the means of contributing greatly to their subsistence by driving worms to the surface of the earth, and furnishes another striking proof that the 'fowls of the air' have their food provided by an almighty and superintending Providence in a variety of ways.

Le Court, who assisted M. St. Hilaire in his observations, and who appears to have been a sort of philosophical mole-catcher, was surprised when the naturalist expressed a doubt as to the mole seeing. He informed him that, in swimming rivers, they habitually guide themselves by their sight; but, in order to satisfy M. St. Hilaire on this point, he contrived the following experiment with him:—They made two openings in a dry tiled drain, at one of which several moles were successively introduced. Le Court took his stand at the other. If he stood quite still, the mole soon came out and escaped; but if, at the moment in which she showed herself at the hole, he moved only his thumb, she stopped and turned back. By repeating this as often as she re-appeared, the mole was kept imprisoned in the drain.

There has been a very general idea amongst our mole-catchers, that if the smallest drop of blood is taken from a mole it occasions instant death. Le Court seems to account for this opinion, in speaking of the fights which take place between the male moles, by saying, that if one is ever so slightly wounded in a vein near the ear, the wound is mortal.

In order to ascertain the rate at which a mole moved, he put in practice the following curious experiment:—He placed some slight sticks, with a little flag at the top of them, in the run of a mole, which he had previously ascertained by tracing it to be of considerable length, and along which the mole passed and re-passed four times a day in search of food. These sticks were placed at certain intervals in the run, so that if the mole touched them, the flag would instantly show it. He then introduced a horn at one extremity of the run, and blowing it loudly, frightened the animal; and she then went along the run at such a rate, moving the flags in her passage, that Le Court and his friends, who were stationed at intervals along the run to assist in the observation, considered that she went as fast as a horse could trot at its greatest speed.

Hunger in the mole is thought to be a more violent feeling than fear; and its appetite is singularly voracious. If it sees a bird near, it quits its hole—approaches as if to attack it; and if the bird pecks it, the mole retires towards its hole, and tempts the bird to follow. She then watches her opportunity—darts upon it—seizes it by the belly, which she tears open, assisting herself for this purpose with her *flaps*, and, thrusting her head into it, devours it. She drinks as greedily as she eats. The mole does not, like the mouse, lay up a store of food, as she preys on worms and various kinds of insects: she will also eat frogs, but will not touch a toad, if ever so hungry A mole was tried with eggs and oysters, but refused to eat either. They will, however, eat fruit, and, Buffon says, acorns. If two moles are shut up together without food, the strongest will devour the weakest, even to the bones: nothing but the skin is left, which they never eat, and which, when one has killed the other, is always seen to be ripped up along the belly. It was found that ten or twelve hours was the longest time they could live without food. This fact seems to prove that the mole is not torpid in frosty weather, which Linnæus asserted she was. It is known that, in such seasons, worms, ants, and the larvæ of cock-chaffers and beetles penetrate deep into the ground. It is probable, therefore, that the runs of the mole made in search of food are regulated, as to their depth, by the habits of the grubs on which she feeds. One would suppose, from the texture of its fur, which is particularly short and thick, that the mole is not very susceptible of cold. Indeed, its whole formation is admirably adapted to its mode of life.

It has been said that the mole, when the ground which it frequents is flooded, will climb up trees. This, however, seems to be unnecessary, as I have seen it swim with perfect ease, which indeed Le Court had also observed.

'Now air is hush'd, save where the weak-eyed bat,
'With short, shrill shriek, flits by on leathern wing.'
COLLINS.

IT is probable that we had formerly a larger breed of bats in this country than we find at present. One of the workmen employed in the repairs of Cardinal Wolsey's Hall, in Hampton Court Palace, brought me the skeleton of a bat, which he found at the end of one of the rafters of the ceiling. The animal, when alive, must have been as large as a pigeon. The *hooks* were very strong. The natural history of the bat is very curious, and we have some particulars respecting it in M. St. Hilaire's work, to which I have already referred in speaking of the mole. The claws of the hind feet of the bat are all of an equal length, and thus better adapted for enabling the animal to suspend itself, which it does with the head downwards, that being its natural posture of repose *. By adopting this attitude, the bat, on being disturbed, can readily disengage itself, and dropping into the air, can take flight immediately. If, on the contrary, the animal rested upon a surface, it is well known that it could not easily raise itself. Even if it perched with its head upwards, it could not disengage itself so readily, or be aware of the approach of danger, so soon as it does while resting with its head downwards. The wings of the bat serve them as a sort of mantle or cloak when at rest, and in which they sometimes also cover up their young, though they will at other times fly about with two of them hanging to the breast in the act of sucking. The wings, by their delicate structure and extent, serve as feelers to the animal in guiding its flight in the dark. The celebrated naturalist Spallanzani ascertained this to be the case by the following experiment. He hung up some cloths across a long room, with holes in them here and there, large enough for a bat to fly through. He had previously prepared some for this experiment by depriving them of their sight, and, as much as possible, of their hearing. On being turned loose, he found that they flew without the least difficulty through the holes in the cloths. It is inferred, that as they did not anywhere touch the cloth, they must have been warned of their approach to it by feeling the repulse of the air set in motion by their wings, and have distinguished the hole by no such reaction taking place. It was observed in the case of a blind boy, who was coming towards a person who stood perfectly still in the room where he was, that when he had approached within a short distance, he suddenly stopped, stamped with his foot, and then turned off to one side *. He must have perceived a difference in the action of the air. But I once observed a still more extraordinary instance of this susceptibility in discovering danger, in the case of a blind horse. I was in the habit of driving this horse in a gig, and by way of experiment I often brought him suddenly up to a closed gate, through which he had probably never before passed, but he always stopped short, and I never could force him against it. This horse was perfectly blind, and must have avoided the gate, in consequence of perceiving that there was some immediate intervening object which obstructed that current of air which he had previously been conscious of. We know that a blind horse will sometimes step into a hole or a ditch, but he rarely runs himself against a post or a tree. It may be thought that, in these two last instances, the *ears* assisted in guiding, probably by their being able to perceive a difference in the sound of their step.

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* A large quantity of bats were lately discovered in an old tree in this neighbourhood, and all of them hanging with their heads downwards. One of them, which I kept under a glass in my room, always turned his back to the light, and did not move during the day.

Marsh, in his Travels, mentions that, on entering a cave, he found the whole roof covered with bats hanging by one leg.—*Note, second edition.*

But to return to the bat. She will sometimes settle on the ground, and when she does this, she shuts up her wings, and is then able to walk and even to run, at a good pace, though with considerable awkwardness. She probably only alights on the ground in search of food when she is unable to procure it on the wing. When on the ground, she runs to find some eminence from which she may raise herself into the air. Bats hybernate by getting into concealed places for security, and they then wrap themselves up in their wings.

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* A blind boy of the name of Fitzgerald, who is now the organist of Hampton Court chapel, caught fish in a temporary pound, in Mr. Woolmere's pond at Hampton, with his hands. He said he was enabled to do this by hearing them move.

Bats seem to be gregarious animals. Vast numbers of them were lately found under the roof of an old building in Richmond Park. I had two sorts of them brought to me, nearly similar in shape, but one very considerably larger than the other. This latter is probably the *Vespertilio altivolans** mentioned by Mr. White in his Natural History of Selborne, answering to his description of it. It measured nearly fifteen inches from the tip of one wing to the tip of the other. Its ears were very short, and its fur of a chestnut colour. The place where it was found had a most offensive and noisome smell. These larger bats were quite as numerous as the smaller species. A great number of them were also found in an old building in Coombe Wood adjoining Richmond Park; and subsequently (in November last) ten of them were discovered in a decayed tree in that Park. This circumstance shows that they do not migrate as Mr. White thinks they may do. I sent live specimens of these bats to the London Zoological Societies.

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* I have since found that it is the *Vespertilio noctula* of British authors. Our bats have not received the attention they deserve. We have fifteen different species of them.—*Note—second edition.*

'There arise insurmountable difficulties when we go about to con-
'sider what relation any one body bears to another.'—EDWARDS.

IT is extremely difficult to trace satisfactorily the 'links of nature's chain,' in the several gradations by which they connect animal and vegetable beings. These links are much more extensive than is generally supposed. Some of them are evident enough, and others we are at a loss to determine whether they should be classed amongst animals or vegetables. Mr. Edwards* seems to think that many of them may be deemed of a middle nature, partaking of both; for, though some of the polype and coralline species seem to adhere by roots, and increase as vegetables do, by shooting forth young polypes from their sides, and by becoming perfect polypes from the divided parts of others, which are marks of vegetation, they have at the same time a power to move their parts, and put forth tentacula or arms, with which they catch small insects whereon they feed, thereby showing that they partake of an animal nature.

A person lately sent me an animal which fishermen call a sea-mouse, and which seems to partake of the properties of both fish and insect. It was about three inches and a half in length, and was covered with a beautiful silky hair on the sides, which put forth a variety of colours in the sun, like spun glass. The belly appeared like that of the wood-louse; and, like that insect, it had the power of rolling itself up on being disturbed. On each side of the belly there were twenty or thirty little fleshy excrescences, each of which had five or six black hairs in it about a quarter of an inch long, with which the creature moved itself along. It is, I believe, an aphrodita, but its relations are very obscure. It is called by French naturalists *la taupe de mer.* It is perhaps going too far to call this animal one of nature's links, though it certainly appears like one.

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* See his Essays on Natural History.

The humming-bird moth (*sphinx stellatarum*) might almost be thought also to be a link between the bird and an insect. It hovers over flowers in a most rapid and elegant manner, as the humming-bird is described as doing—unfolds its long tongue, and extracts the honey from flowers, making a humming noise the whole time. Its motions are so rapid, especially on a sunny day, that it is extremely difficult to follow them. There is also a wildness in its habits which partakes very much of those of a bird.

'Birds are extremely important creatures for the economy of 'nature in general. They destroy innumerable insects, and the 'thoughtless extirpation of some birds, supposed to be noxious, such 'as sparrows, crows, &c., has generally given rise to an infinitely 'more prejudicial multiplication of vermin.'—BLUMENBACH.

IT is a general observation of the country people, that when there is an unusual number of hawthorn and holly berries, there will be a hard winter. The remark is perhaps more true than is generally supposed, and may be considered as a proof of the care which is taken by an Almighty Power of its creatures. How many birds would perish during a severe winter, if this provision had not been made for them! Even the circumstance of some springs not freezing, is an instance of the same goodness. If they did, the destruction of animal life would be much greater than it now is. At present many birds are able in hard weather to find water and food. The robin, thrush, and blackbird, with woodcocks and snipes, resort to these springs, and are able to support life with the worms and insects they find in or by the side of them, till more genial weather arrives. In deep snow many birds frequent woods, where, amongst old dead and decayed trees, and the bark of others, they discover and feed upon insects. Horses and deer scrape away the snow with their feet to get at the grass, and hares and rabbits feed on the bark of trees. The titmouse in frosty weather creeps near houses, and picks meat from bones. The hedge-sparrow and wren search at the bottoms of hedges, where the snow has not penetrated, for insects. The wood-pigeon feeds on the tops of turnips, while sparrows, finches, yellowhammers, &c., get into rick-yards to satisfy their hunger. Most birds therefore are able to procure some sort of sustenance during a hard winter; and some animals remain during that period in a state of torpor, from which the influence of the sun in spring revives them. Insects appear but little affected by cold weather, as we see many on the first mild day after the severest frosts. Bees survive the coldest winters in Russia, and afterwards lay up much store of honey.

We thus see that, however miserable the condition of birds in severe weather may appear to a cursory observer, they have resources provided for them in various ways. The same beneficent Being who created them provided at the same time means for their subsistence. It is man who occasions the chief miseries of the creatures which surround him. When, however, we consider that these creatures are the objects of God's care, how careful ought we to be never to inflict any unnecessary pain or misery upon them. I should not think kindly of that man who could wantonly put his foot on a worm which was crossing his path, or destroy a fly for the gratification of doing so[*].

'Poor harmless fly!
'That, with his pretty, buzzing melody,
'Came here to make us merry; and thou hast killed him.'

The countless myriads of insects which surround us are necessary for the support of various kinds of birds.

I take great pleasure in watching the activity of those which feed on flies. The water-wagtail darts after them with great rapidity, and when collecting them for her young, places each fly as she catches it in the corner of her mouth till there is a considerable accumulation of them. When she opens her mouth to seize a fly, one expects to see the others fall from it; but this never happens. I have also observed that when a wagtail has a young cuckoo to feed, she collects a larger number of flies in her mouth than one who is engaged in supporting her own young. When this bird has collected a sufficient number of flies for a meal for her young, she gives two or three chirps as she approaches her nest, which her brood understand, and they are ready with open mouths to receive the food. The young cuckoo understands these chirps, and I have seen him eagerly prepare himself for the approach of his foster-mother long before he could see her.

I have never observed that the swallow, in hawk-ing for flies for her young, accumulates them by the side of her mouth as the wagtail does. One hears the snap of her beak when she takes a fly, and it is curious to see the instinct which prevents her seizing a wasp during her rapid flight. Swallows are indefatigable in providing food for their young while they are in the nest; but should the nest by any accident be brought to the ground before the brood are able to fly, the old birds take no further notice of them; they are left to crawl about and die. The old birds are so much on the wing, that they probably never think of looking for their young on the ground, where, indeed, they so seldom alight themselves. The affection which birds show to their young is very great, and continues in many instances till the next breeding season. Our common hen will keep her last brood by her side till she lays again, and I have observed that they roost next her during a whole winter after they are full grown. Her interest in them does not cease till the following spring, when she has a fresh charge to bring up. An instance of this care and affection is mentioned by Mr. Graves in his British Ornithology. It occurred in the case of a pair of sparrows that had built their nest in a wall contiguous to his residence.

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'Having noticed,' he says, 'that the parent birds 'continued to bring food to the nest for some months 'after the brood had left it, we had the curiosity to 'place a ladder against the wall for the purpose of which was crossing his path, or destroy a fly for the gratification of doing so*.

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'bouring youth to get at this eyrie: the difficulty 'whetted their inclinations, and each was ambitious 'of surmounting the arduous task. But when they 'arrived at the swelling, it jutted out so in their way, 'and was so far beyond their grasp, that the most 'daring lads were awed, and acknowledged the 'undertaking to be too hazardous. So the ravens 'built on, nest upon nest, in perfect security, till the 'fatal day arrived in which the wood was to be 'levelled. It was in the month of February, when 'those birds usually sit. The saw was applied to 'the butt, the wedges were inserted into the opening, 'the woods echoed to the heavy blows of the beetle 'or mallet, the tree nodded to its fall; but still the 'dam sat on. At last, when it gave way, the bird 'was flung from her nest; and, though her parental 'affection deserved a better fate, was whipped down 'by the twigs, which brought her dead to the 'ground.'

It is not easy to account for the variation we sometimes perceive in the plumage of birds of the same species. I have observed a rook with one white wing during the last three years in the rookery in Hampton Court Park; and I saw a sparrow nearly white amongst a flock of those birds at West Molesey. A linnet was shot and brought to me from the same place, which was beautifully mottled with white and brown. Some years ago I was shown some white blackbirds in the grounds of a nobleman at Blackheath, which had bred there; and what showed this was not an accidental circumstance, they produced young of the same colour as themselves *.

Partridges manifest great caution in choosing the place where they intend having their nest. I have observed them to remain near the same spot for some weeks before the female lays her eggs; and if in the mean time they should discover the retreat of any animal in the neighbourhood, who is likely to be injurious to them, they shift their quarters. I have generally noticed that partridges lodge themselves at night near the middle of a field, probably being aware that they are safer in this situation from the attacks of stoats or weasels, than if they got nearer hedges, under the roots or banks of which these animals conceal themselves. Some birds utter a peculiarly plaintive cry on the approach of danger. Even when they are concealed in the midst of a thick hedge they give warning, should any marauder in the shape of a cat or a weasel come near them. There is something in this mournful cry which cannot be misunderstood. The blackbird and thrush have it, but I have more generally observed it in the hedge-sparrow and redbreast.

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indebted for this extraordinary apprehension of the danger which threatens them to an instinct implanted in them as their safeguard by a kind and beneficent Providence? If animals had escaped from some particular danger, they would naturally avoid it in future; but we see that they endeavour to shun it in cases where they have had no previous intimation of it. A young duck, as soon as it has escaped from its shell, will swim into a pond, and catch gnats and flies; but give it a wasp, and it immediately avoids an insect the sting of which would probably kill it. Young chickens, also, as soon as they are hatched, will take shelter under their mother's wings at the sight of a distant hawk in the air, while they show no dread at a turkey or a goose, however nearly they may approach them, though the latter have much the most formidable appearance.

Amongst the wild cattle which are still found in two or three of our parks in England, the young calves show considerable ferocity as soon as they are dropped; while the calves of our domestic cows are remarkable for their gentleness, and allow themselves to be handled without exhibiting any signs of fear or wildness. I have also observed that the kittens of a cat who prowls about our barns and outhouses, and

avoids observation, are much more fierce in their nature than the young of a cat who has become familiar with us by kindness, and accustomed herself to live much in the house. The parents' ferocity or tameness seem to be imparted to the young with life; and this I believe will be found to be the case with most animals.

I always listen with great attention to the observations made by country people on the peculiar habits of some animals. Thus I have heard them say, that when the swans on the river Thames fly against the stream it is sure to rain, and that this will be the case when rooks are more than usually clamorous on their return to their roosting-places in an evening *. The scream of a peacock, and the peevish incessant cry of the guinea-fowl, are also fatal prognostications. The loud and discordant note of the woodpecker is a sign of change of weather, and it is therefore in some places called the rain-fowl.

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I observe fish sometimes move their fins with great rapidity, and make short darts in the water, and then renew the movement of their fins, like a hawk hovering in the air: they thus support themselves in any depth of water. When the fins are drawn in, the fish sinks to the bottom.

Craw-fish are preserved in tanks in great quantities, by a fisherman at Hampton Court. They breed freely in these tanks; but the young escape through the holes, though they keep much in the immediate neighbourhood of the place. They cast their shells annually; and if one of the claws or horns is broken off, it is reproduced.

Some of the Thames fishermen are of opinion that gudgeons go to the brackish water of the river to breed. They account for the annual diminution of their numbers from the circumstance of the water being affected by deposits from the various gas-works of the metropolis. They attribute to this cause the very few eels which are now caught.

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Mr. Marshall caught a trout, near Shepperton, which weighed sixteen pounds. That most expert and amiable disciple of Izaak Walton had hooked it a day or two before in trolling, with ten or twelve hooks to his line, which the fish broke. On landing it, (which, by the bye, took him forty minutes to do,) the first set of hooks was found in its mouth. Mr. Marshall tells me that he has frequently caught fish with hooks in their mouths. This seems to prove how very little fish are susceptible of pain in that organ.

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MISCELLANEOUS OBSERVATIONS ON NATURAL HISTORY.

'—— Shreds and patches.'—SHAKSPEARE.

FLOUNDERS, turbot, and flat fish generally (Pleuronectes) are such slow swimmers, in consequence of their natural formation, that they would become an easy prey to their several enemies if they were not endowed with the following properties:—Both their eyes are on one side of the head; and it is well known, that when they swim, it is in an inclined position, and that their eyes must be then turned uppermost. They also swim close to the bottom of the sea or rivers, and are thus enabled to perceive the approach of danger from above. They also generally move about in the night, lying flat on the ground in the day-time. Their upper part is of a dusky, muddy colour, so that it is not easy to perceive them; and they remain perfectly motionless when danger is apprehended. I have frequently observed this in flounders; and it is not a slight touch which will induce them to move.

It is a well-ascertained fact, that if a cow produces twins, one of which is a male and the other a female, the latter is never known to breed. She is called a Free-martin. The farmers about me say that they fatten kindly.

I observe fish sometimes move their fins with great rapidity, and make short darts in the water, and then renew the movement of their fins, like a hawk hovering in the air: they thus support themselves in any depth of water. When the fins are drawn in, the fish sinks to the bottom.

Craw-fish are preserved in tanks in great quantities, by a fisherman at Hampton Court. They breed freely in these tanks; but the young escape through the holes, though they keep much in the immediate neighbourhood of the place. They cast their shells annually; and if one of the claws or horns is broken off, it is reproduced.

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If the leaves of trees are very late in making their appearance, I observe that cockchaffers do not leave the ground at the usual time, but remain buried till food is to be had. This instinct is very extraordinary.

An owl had, for a vast number of years, frequented a hole in the wall of a house at Tidexstone, in Glamorganshire. On repairing the house, this hole was stopped up; but the owl was in consequence so clamorous, that the inhabitants had no peace till the hole was again opened. This bird was generally supposed to have occupied the hole for many years.

I hear of a hive of bees on the top of a house in the middle of Holborn, which is doing very well. The circumstance of bees finding their way home through the thick smoke, fogs, and vapours of the metropolis, seems to prove that their course is not directed by sight, but by some still unexplained instinct.

I have had three hornets' nests, at different times, in some empty bee-hives. The female begins by making a strong stalk, which she fixes to the top of the inside of the hive, and then forms a sort o.

cap, worked from dry, decayed wood. In this cap she makes at first only three or four cells, which are subsequently increased in size and number, till all her eggs have been deposited. I put a female hornet under a wine-glass on my table, from which she nearly escaped by getting her feet under the edge of the glass, and then raising it up. Their strength is very great, and they will fly away with a piece of pear bigger than themselves.

Some ducks, the peculiar species of which I have not yet been able to ascertain, were sent from Lincolnshire to a friend of mine, who turned them into the water in St. James's Park. They were at first very shy, and hid themselves amongst the shrubs on the islands. On being driven away, they dived, and could continue seven minutes under the water: one of them remained so long that he was drowned. Fear must have predominated in this bird over everything else, till the last moment of its existence.

Some persons suppose that the sight of the salmon is as acute as that of the eagle.

Squirrels not only feed on the cones of fir-trees, but gnaw the tops of the leading shoots.

'———— I am one
'Who love the greenwood bank and lowing herd,
The russet prize, the lowly peasant's life,
Season'd with sweet content.'

ANONYMOUS.

I HAVE more than once in these papers referred to some notes which I have been accustomed to make of remarkable seasons and natural incidents. On looking over my notices of the summer of 1818, they appeared to me sufficiently interesting to be worth transcribing; and I have therefore given them as I wrote them down at the time, with some few additional remarks.

July 13*th,* 1818.—The spring and summer of this year have been unusually fine. On the 14th of April the first hive of bees I could hear of swarmed.

About the 30*th* of *June,* the lime-trees were in blossom.

On the 1*st* of *July,* the grapes against my garden-wall were as big as peas; and on the 8*th* of that month, wheat in the neighbourhood of London was generally reaped. The country was parched to the greatest degree. The crops of grass have been so light, that hay was sold this month as high as nine guineas a load.

July 25*th.*—The thermometer this day stood in the shade, during the greater part of the day, at 92°, and in the sun at 116°.

July 12*th.*—Wheat was brought into the Reading market.

July 26*th.*—Flowers of every description have entirely disappeared. The ground continues parched to a degree seldom known in this country. Cows are generally fed upon hay. Insects are not very plentiful, and I have only seen one wasp this year. Some rain fell for a short time this evening. As soon as this happened, I observed vast quantities of swallows flying over the river Thames, and continuing to do so till the rain ceased, when not one was to be seen.

July 27*th.*—The leaves of the lime-trees and horse-chestnuts are falling, and trees generally have a very autumnal appearance.

July 29*th.*—Bees almost entirely confine themselves to their hives during the finest days of the latter part of this month, owing to the want of flowers.

August 25*th*.—The dry weather still continues. It began early in May, and we have been without rain, with the exception of two or three showers, since that time.

September 1*st*.—Partridges are in greater abundance than has been known for many years past; but they are very wild, owing to the want of shelter, as there are no turnips, and the stubbles have been generally cut, in consequence of the dearness and scarcity of straw.

September 3*rd*.—Owing to the dry weather, potatoes are dear and scarce, and they have been selling for as much as apples, which are plentiful. Onions also are so dear, that they have sold for as much (in Covent-Garden market) as inferior peaches.

September 6*th*.—There has been a fall of rain, which seems likely to continue.

December 13*th*.—The weather has continued almost invariably fine and mild. Violets are in great abundance. Lilacs and many other shrubs are putting out their leaves. Two Glastonbury thorns are now in full blossom at this place, and the nasturtiums are still growing, and do not appear to have suffered from frost, though perhaps they are the first plants which feel its effects.

December 14*th.*—Blackbirds and thrushes sing morning and evening, as in spring. Turnips, which late in the autumn were so unpromising, are now a fine crop, especially on light lands.

December 16*th.*—A *pyrus spectabilis* is in full blossom in a garden at Putney, and also a Glastonbury thorn. The dwarf dog-rose also blossoms, as well as the single anemony. I also hear of violets, both white and blue, having blossomed freely in Essex.

December 17*th.*—It froze rather severely last night. Large flocks of the small wild blue pigeon have appeared on the Sussex coasts, and many of them have been shot near Brighton, generally about eight o'clock in the morning. May was sold this day in full blossom by a countryman on Westminster bridge.

December 20*th.*—This day I saw sparrows busily employed in building their nests.

December 22*nd.*—A severe frost appears to have set in, and the fog is the thickest we have had in this country for many years.

Those who recollect the very extraordinary seasons of the year I have referred to will not be at any loss in calling to mind many of the circumstances above-mentioned. The summer, however, of 1822 was perhaps still more extraordinary. The following are a few of the remarks I made in the course of that year:—

1822.—Winter uncommonly mild. Many spring flowers were in full blossom in February.

March 2nd.—Saw a sycamore tree nearly in full leaf, and a butterfly the same day.

March 20th.—Heard of bees swarming the beginning of this month.

March 28th.—A swarm of bees settled in a garden near Kingston-on-Thames.

March 31st.—Saw the first swallow; heard the cuckoo also this day.

June 25th.—Harvest begun in many parts of England.

June 30th.—Corn brought to market. Apricots, plums, and some sorts of apples, ripe.

July 5th.—A great deal of corn has been cut and carried. Lime trees quite out of blossom. I observe but few swallows in our neighbourhood this year. Grapes are in great abundance against the walls, and are very forward.

August 15th.—Dry weather has continued for some months. Out-of-door grapes are ripe. Leaves fall as if late in the autumn. Walnuts ripe.

August 18th.—Swallows congregate.

Though these trifling remarks may not be entirely without interest, especially to those who keep an account of, and take a pleasure in comparing one season with another, they may serve as a specimen to others of the way in which occasional notices may be made of the weather, and different circumstances connected with natural history. I will venture to say that no one who ever took the trouble to do it, thought his time ill bestowed, or looked over his remarks without deriving pleasure from their perusal.

The enjoyments and delights of a country life have been sung by poets in all ages, and it is our own fault if we find the country irksome, or less agreeable than a crowded metropolis. It offers many resources of a most agreeable nature, to those who seek for rational and tranquil enjoyments. A beautiful prospect, a walk by the side of a river in fine weather, or the agreeable shade of a wood or cool valley, have great charms for those who are fond of the country. We may then exclaim with Virgil—

> 'O! qui me gelidis in vallibus Hæmi
> 'Sistat, et ingenti ramorum protegat umbrâ ?'

'The byrdes that flye abroade, do love their own nestes. The
'beastes that ronne astray, seketh their accustomed cowches.
'And the fyshes within the water, resorteth to their hollow
dennes.'

LELAND.

THERE is no writer on natural history, who gives me more pleasure and information than Blumenbach, or who says so much in a few words. Almost all his remarks on the animal creation carry conviction with them, and some of them are so curious, that I am tempted to make a few extracts, which will not be unacceptable to those who have not met with his 'Manual of the Elements of Natural History.'

Ourang-outang (*Satyrus*).—Camper has proved by dissection, that it is not capable either of speech or of walking naturally in an upright posture. It is not numerous; whilst the human species, amounting to about a thousand millions, is the largest among mammiferous animals.

Coaita (*Cercopithecus Paniscus*). — Extremely dexterous in the use of its long prehensile tail. The singular manner in which they hang together, so as to form a chain, for the purpose of swinging themselves from one tree to another, on the opposite banks of a river, is represented in the original edition of Ulloa's Viage, &c.

Dormouse (*Glis Avellanarius*).—For its winter sleep it prepares a globular and tolerably solid nest of the needle-shaped leaves of the fir, in which it conceals itself.

Economic Rat (*Mus Œconomus*).—Remarkable for the emigrations which it makes, principally from Kamtschatka, like the lemming in certain years; but still more so, for the industry with which it collects large quantities of roots in its burrows, which are plundered by the Tungooses, &c., in the same manner as the stores of the hamster by the inhabitants of Thuringia.

Black Rat (*Mus Rattus*).—Extremely voracious. It eats even scorpions, and follows man and his provisions everywhere, into the deepest mines, as well as into his ships.

The Marmot (*Marmota Alpina*).—It is occasionally met with on the Allée Blanche, in Savoy, upon isolated rocks, which project like islands from the sea of ice, at the distance of some leagues from any part that is not frozen, and not free from snow for more than six weeks in the whole year; so that it would appear that the marmot, in such situations, must sleep at least ten months in the year, and pass an extremely small part of its existence in a waking state.

The Hamster (*Marmota cricetus*).—Lives chiefly on corn and beans, of which it carries large quantities, in its cheek-pouches, to its subterraneous burrows, sometimes seven feet deep. A hole of this kind will contain sixty pounds of such provisions. It increases rapidly, and in the district of Gotha alone, as many as ninety thousand hamsters have been killed in one summer.

The Hedgehog (*Erinaceus Europæus*).—A nocturnal animal—feeds both on animals and vegetables—mouses like a cat—can eat cantharides in great quantity. It sticks its prickles into fruit, for the purpose of bringing them to its holes—a fact I have been assured of by three credible witnesses.

The Elephant (*Elephas*).—The young one sucks with the mouth, and not with the trunk, as many have asserted. It is probable that the elephant will live two hundred years. Its step consists in a quick, shuffling motion of the legs, but so sure, that it never stumbles, even on the worst roads.

The Seal (*Phoca vitulina*).—On dissecting the eye of a seal, I found a remarkable deposition through which the animal is enabled to elongate or shorten the axis of the organ at pleasure, and by that means to see equally well in two media of very different density, viz. water and air.

The Duck-billed animal (*Ornithorhynchus paradoxus*).—This extraordinary creature is distinguished from all mammiferous animals yet known, by the unprecedented formation of its jaws, which resemble, in the closest possible manner, the broad, flat bill of a duck—are covered in the same way with a soft membrane, plentifully supplied with nerves for the purpose of tasting—and also, like it, serrated at the lateral edges. The feet are provided with webs, which in the front ones project beyond the claws, and can by that means be folded up or expanded, like a fan. No appearance of teats has been hitherto detected in either sex. This wonderful animal lives near the lakes about Botany Bay, in the fifth part of the world, so rich in creatures of remarkable formations.

The Redwing (*Turdus Iliacus*).—It smooths its nest with clay and rotten wood; and as the latter shines in the dark, it is possible that a mistake may have given rise to the idea of the ancients of an '*avis Hercynica noctu lucens*.'

Cross-bill (*Loxia gregaria*).—Found at the Cape, where many hundreds together build their nests on a single tree, and cover the singular edifice with a common overhanging roof.

The Snow-bunting (*Emberiza nivalis*).—It is the only living creature that is found at the height of two thousand feet above the limit of perpetual snow.

Titmouse (*Parus*).—It has been remarked of this and other species of this genus which remain with us in the winter, that during that season the bill becomes harder than in summer, and is consequently better suited for taking their food from the frozen ground.

The Salangane (*Hirundo esculenta*).—It builds the celebrated Indian nests, the materials of which resemble isinglass, in holes on shores and hills. At least four millions of these nests are collected annually, and mostly exported to China.

The Goat-sucker (*Caprimulgus Europæus*).—A nocturnal animal. It makes a purring noise in flying. It lives on insects, particularly moths. The old tale that it sucks the milk of goats is wholly unfounded.

The Stormy Petrel (*Procellaria pelagica*).—The inhabitants of the Feroe Islands use them as lamps:

they pass a wick through their bodies, which, when lighted, burns a long time, from the quantity of fat they contain.

The Gannet—Solan Goose (*Pelecanus bassanus*). —It is the principal food of the poor islanders of St. Kilda, whose women wear the skin instead of shoes, which only last about five days, but are immediately replaced by others.

The Stork (*Ardea ciconia*).—It lives not only on amphibia, but also destroys useful animals—whole broods of partridges, for instance. It frequently carries linen, thread, &c. to its nest, for the purpose of lining it.

Amphibia.—They can endure for a time the extremes of heat and cold. For example, there are undoubted proofs of newts and frogs having lived in the stomach and intestines of human beings; and of their having recovered, after being frozen perfectly hard.

Many amphibia, when in a state of captivity, do not take any food, but can fast for an astonishing length of time. I have often kept salamanders for eight months together without food, and yet they did not appear materially reduced. As to tortoises, it is known that they can exist full a year and a half without eating.

There is a great tenacity of life in amphibia. Frogs are known to leap about after the heart has been torn out; and tortoises to live for months after the brain has been removed. The tails of newts, blind-worms, &c., have the power of motion after they have been separated from the bodies.

Many amphibia, particularly among serpents, do not deposit the egg until such time as the young animal contained in it is nearly perfect. The Pipa hatches its eggs on its back. The male places the spawn, which the female lays in the usual manner on her back. The ova grow, as it were, in the substance of the skin of the mother, until at the end of nearly three months, the tadpoles, which at first have tails, have arrived at their full period; and the tail having been replaced by four feet, they quit the mother's back.

Toad (*Rano bufo*).—There is no truth in the assertion that its urine is poisonous. On the other hand, it is indisputable that living toads have been found in sawing through blocks of stone, trees, &c.

Tree Frog (*Rano arborea*).—The clammy slime with which it is covered, like serpents, serves to support it among the leaves of the trees, in which it lives. In croaking, they expand the throat like a large bladder.

Gecko-Lacerta.—It has a poisonous fluid between its scaly toes, which it communicates to the eatables over which it passes.

Chætodon rostratus.—A fish found in the East Indies. Its upper jaw ends in a tube, through which the fish throws water on the insects upon aquatic plants, so that they fall, and become its prey.

The Sucking-fish (*Remora*).—This singular animal can attach itself most firmly, by means of the grooves on the back part of its head, to ships, sharks, &c. Hence the fable, that it was able to stop a ship in full sail.

The Miller's Thumb (*Cottus gobio*). — The female deposits her spawn in a hole, and watches it until the young ones are hatched.

GENERAL OBSERVATIONS.

Many plants, common duckweed, for example, are not firmly attached to the ground by their roots, but can change their situation at certain seasons of the year, sinking at one time to the bottom, and at others coming to the surface of the water.

The peculiar effect which some climates produce on organized bodies, particularly animals, is very singular. In Syria, for example, the cats, rabbits, and goats, have extraordinarily long white hair; in Corsica, the horses and dogs are spotted in a peculiar manner. In Guinea, the men, dogs, and fowls, became negroes in their different ways.

Nearly the whole of the eye of a water-newt (*lacerta palustris*) was extirpated, all the humours were evacuated, and four-fifths of the membranes cut away; notwithstanding which, within ten months a perfect new eye was formed, with cornea, pupils, lens, &c.

The general purpose of rumination, as applicable to all the animals which chew the cud, appears to be still unknown.

Whole nations are enabled to supply nearly all their most urgent necessities with a single species of mammiferous animals: the Greenlanders with the seal; the Laplanders, Tunguses, &c. with the reindeer; the Aleutians, with the whale.

The skeletons of fishes which are found generally very well preserved in the schist of Mount Volca, near Verona, can in general be very positively referred to known species. It is remarkable that this mountain should form a common receptacle, not only for fresh-water, but also for sea-fish, and that the latter should comprise creatures from the most remote parts of the ocean, from Otaheite as well as from the Mediterranean, from the coasts of Japan, Brazil, the north-east of America, from Africa, &c.

The Academical Museum of Göttingen contains a step of a miner's ladder, found in a mine in the Rammelsberg on the Hartz, which had been abandoned at least one hundred years, and on which is deposited a collection of drusy crystals seven inches in diameter, and of exceeding splendour.

OUR VILLAGE.

‘ Sweet was the sound when oft, at evening's close,
‘ Up yonder hill the village-murmur rose;
‘ There as I pass'd, with careless steps and slow,
‘ The mingling notes came soften'd from below;
‘ The swain responsive as the milk-maid sung,
‘ The sober herd that low'd to meet their young,
‘ The noisy geese that gabbled o'er the pool,
‘The playful children just let loose from school,
The watch-dog's noise that bay'd the whispering wind,
‘ And the loud laugh that spoke the vacant mind:
‘ These all in sweet confusion sought the shade,
‘ And fill'd each pause the nightingale had made.’
GOLDSMITH.

THERE is something very pleasing in rural sounds and rural objects. The noise of village boys playing at cricket, the cawing of rooks in a still evening, the distant tread of a horse, the sheep bells, even the village clock, are all pleasant. I like to see cows going to be milked, and inhale with satisfaction the fresh and fragrant perfume which one perceives as they pass by. Those that have calves are always in advance, and show their impatience to reach their young, by an occasional bellow, and a short run, and then a sudden stop to listen whether they can hear the call of their calves. If they do, how eagerly do they advance to the gate of the farm-yard, and show the utmost anxiety to have admittance. The clean, well-scoured milk-pails and churns are no unsightly objects; and while the process of milking is going on in a well-littered farm-yard, the cows quietly chew the cud, and appear contented and happy. Those, however, which have been recently deprived of their young ones, show a reluctance to give down their milk, and many retain some of it, from a maternal feeling that their offspring may require it.

In the spring one hears the wild whirl of a number of sparrows as they rapidly pass by, and then settle in some neighbouring bush, or hedge, chirping and scolding one another, till some culprit who has been pursued, again takes flight and is again followed with the same clamorous noise. This is succeeded by the song of the thrush on the top of some high elm-tree, and later in the evening the nightingale makes himself heard.

> ' Ten thousand warblers cheer the day, and one
> ' The livelong night.'

On a fine summer's day we hear the tinkling of pans and shovels, to persuade a hive of bees to settle in some cottage-garden, and are pleased even with the whetting of scythes in a neighbouring field. The gobbling of a turkey-cock, the peevish call of a guinea-fowl, and the cry of pigs for their evening food, are far from being unpleasant sounds to those who delight, as I do, in the country.

'The village church, among the trees,
'Where first our marriage vows were given,
'With merry peals shall swell the breeze,
'And point with taper spire to heaven.'—ROGERS.

I like also a village church. The peasant enters in his clean smock-frock, smooths down his hair, says, or appears to say, a word in his hat, which he carefully and deliberately hangs up, and then leans with crossed arms over the door of the pew till the service begins. Both before and after church he may be seen standing with his back against the low wall of the churchyard, with perhaps the hand of a favourite child in his, talking over some village news. As the squire or the clergyman pass by, he touches his hat to them with respect and affection, and in the evening he may be seen with his cottage-door open, drinking tea with his wife and children, and then sauntering about with them either in his garden or some village lane.

The good old squire hobbles out of church, leaning on the arm of his daughter, and kindly inquires after the welfare of all about him. He sends food and money to the sick and needy, makes up quarrels as a magistrate, maintains a well-ordered Sunday-school, and promotes the happiness of his villagers by every means in his power. If on returning from church he meets a smoking dinner going to a cottage from the village bake-house, he generally slips a shilling into the hand of the bearer, for the purpose, as he says, of washing the dinner down with a little good ale. I must, however, add that the old gentleman sometimes slyly takes a good-looking potato out of the dish, which he eats with evident satisfaction.

But how shall I describe our curate? his sunny, good-humoured face is never seen without delight by young and old, rich and poor. He joins in the village sports, and is a famous hand at cricket, and even condescends sometimes to play at trap-ball with the boys, who hail his arrival with great glee. He visits and assists all who want relief, and is never wearied in doing good. He always considers it a bad sign if one of his poor parishioners passes him without touching his hat, or seems to avoid meeting him. He then with great tact and kindness takes him to task. I have heard him say that he is sure to find that the man has been either foolishly spending his money in the ale-house, or his mind has been tainted by listening to the speeches of some radical demagogue in the neighbouring town. In either case he mildly endeavours to convince the culprit of the folly of his conduct, and generally succeeds in setting him right.

To all this good feeling, our curate has a mind stored with learning, and a taste for the fine arts. He, moreover, dabbles a little in antiquities, and takes great delight in his naturalist's calendar, in which he makes observations equally agreeable and instructive.

Such was our village a few years ago, but, alas!

alas! how it has been changed since! A travelling politician has been lecturing in one of our barns, and has made our poor labourers discontented, and consequently idle. All the influence of the good curate has not been able to stem the torrent, and he is about to quit the village in despair of doing any further good. The poor old squire has already left it, after having lowered his rents so much, that he could no longer afford to live with his usual kindness and hospitality. He has therefore abandoned his estates, his tenants, and his labourers to the care of a mercenary bailiff, and is gone to reside in an overgrown town on the sea-coast, upon the residue of a once ample income.

I consider the aspect of this town as one of the most melancholy features of the present times. It is now resorted to by many under the same circumstances with our squire, by those who ought to have made every sacrifice to stem the torrent of disaffection, who should have given up their horses, their carriages, their hospitalities, sooner than quit their villages and country-houses, and sever the tie which connected them with their tenants and labourers. They may hope to return in better times, and to replace things on their former footing. But that tie once broken cannot be restored, and it is melancholy to reflect on the consequences.

'O favour'd land! renown'd for arts and arms,
'For manly talents and for female charms —

where shall we find a country like thee! Giving, as you have done, a tone to the morals, the energies, and public faith of all other countries, whom shame alone has forced to endeavour to imitate your bright examples, how dangerous is the position in which you are now placed! Those whose example should influence the morals and conduct of the peasantry, are congregating in the metropolis, and destroying their time, and health and fortune, in folly and dissipation. The peasantry are badly employed and badly paid*, and the appropriation of the poor's rates is generally left to mercenary farmers and interested shopkeepers. While the poor are thus neglected, they become careless of consequences, hardened, and disaffected. They marry, because they find that a married man receives more parish relief than they do, though perhaps the single man is the best workman; and the parish is burthened with the maintenance of their children.

I have lived all my life in the country, and am well acquainted with the character of the English peasantry. Instances of profligacy and ingratitude may no doubt sometimes occur amongst them; but treat them as they ought to be treated—give them employment, and pay them properly for the work they do—

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* There can be no doubt of the poor labourers in this country being inadequately paid. A kind-hearted landlord, a clergyman, lowers his rent or tithes, and the farmer pockets the amount, without rendering a proportionate assistance to his workmen.

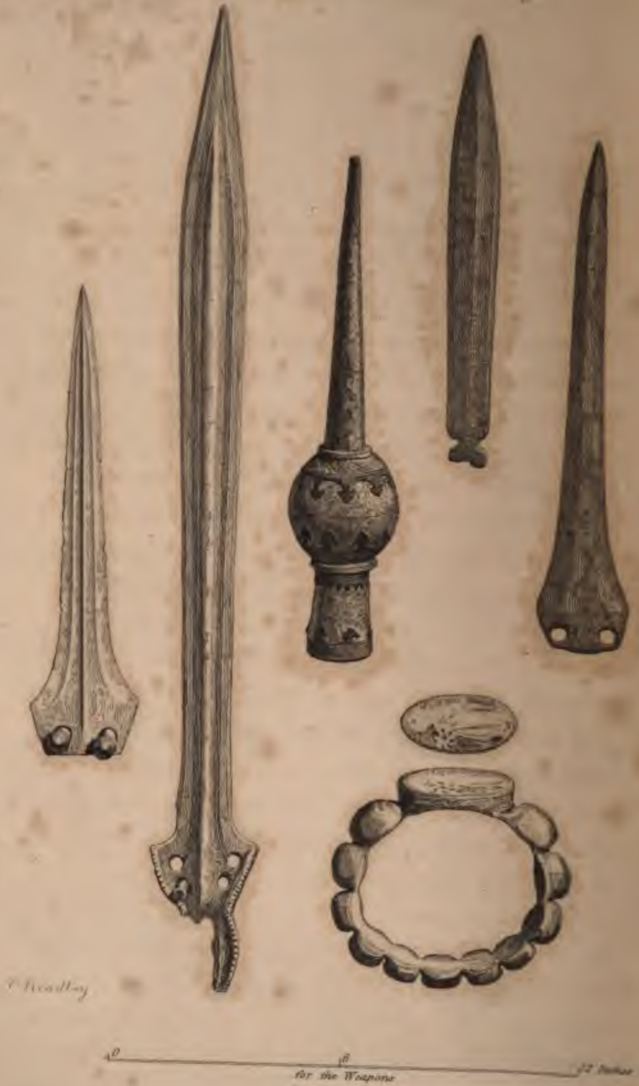
'Let labour have its due!—my cot shall be
'From chilling want and guilty murmurs free.
'Let labour have its due!—then peace is mine,
'And never, never, shall my heart repine.'

And give them also that moral and religious instruction and example which they have a right to expect from those whom Providence has placed in a situation superior to themselves—and I will venture to assert that a more orderly, grateful, and better-conditioned peasantry would not be found on the surface of the globe.

This is the first, and will probably be the last time that I shall appear before the public as an author. I am of course aware that the subject of this chapter has nothing to do with Natural History; but I was unwilling to lose this opportunity of stating my conviction of what is likely to take place, should the poor be abandoned to their own resources, while the rich and powerful are either forgetful of their wants and miseries, or are absenting themselves from the homes of their forefathers, and seeking for pleasures in the metropolis or watering-places. If they do neither of these, they are imbibing foreign habits and manners in foreign lands, and disqualifying themselves for undertaking the duties and enjoyments of an English country life.

Do not however let me be misunderstood. In speaking of the neglect experienced by the poor in many places, I am aware that, amongst the rich and powerful of the land, there are to be found numerous examples of disinterested charity and boundless benevolence. Where time, and talents, and money, have been employed, as they often are, in administering to the wants, and in bettering the condition of the poor, the beneficial results are always to be seen in the well-being, orderly conduct, and gratitude of the peasantry. Disaffection, and riots, and burnings were to be found only in those places where the fostering hand of kindness had been withdrawn.

Antient Weapons and Thumb-ring
found in the bed of the Thames at Kingston.



London, Published by John Murray, Feby 1832.

'Scilicet et tempus veniet cum finibus illis
'Agricola———
'Exesa inveniet scabra rubigine pila,
'Grandiaque effossis mirabitur ossa sepulcris.'

One of the workmen employed in getting out the earth from the coffer-dams that were sunk for the purpose of laying the foundation for the new bridge over the river Thames, at Kingston, brought me three Roman swords which were found deposited at some depth in the ground on the Middlesex side of the river; since when I have further obtained two spear-heads, one of exquisite workmanship and shape, and both quite perfect;—a Roman sword, beautifully fluted near the edges, and nearly as fresh as when it came out of the hands of the maker;—and what appears to have been the iron top of a Roman banner, on which the eagle perhaps was placed. These weapons, &c., and some other relics, which are not in my possession, were found near the same spot, and are pronounced, by competent judges, to be more perfect specimens than any that are to be seen in the Roman, Neapolitan, or Florentine collections. A Roman thumb-ring—at least what was supposed to be one (for it might fit the digitus annularis of a stout old Roman)—was found ale. I must, however, add that the old gentleman sometimes slyly takes a good-looking potato out of the dish, which he eats with evident satisfaction.

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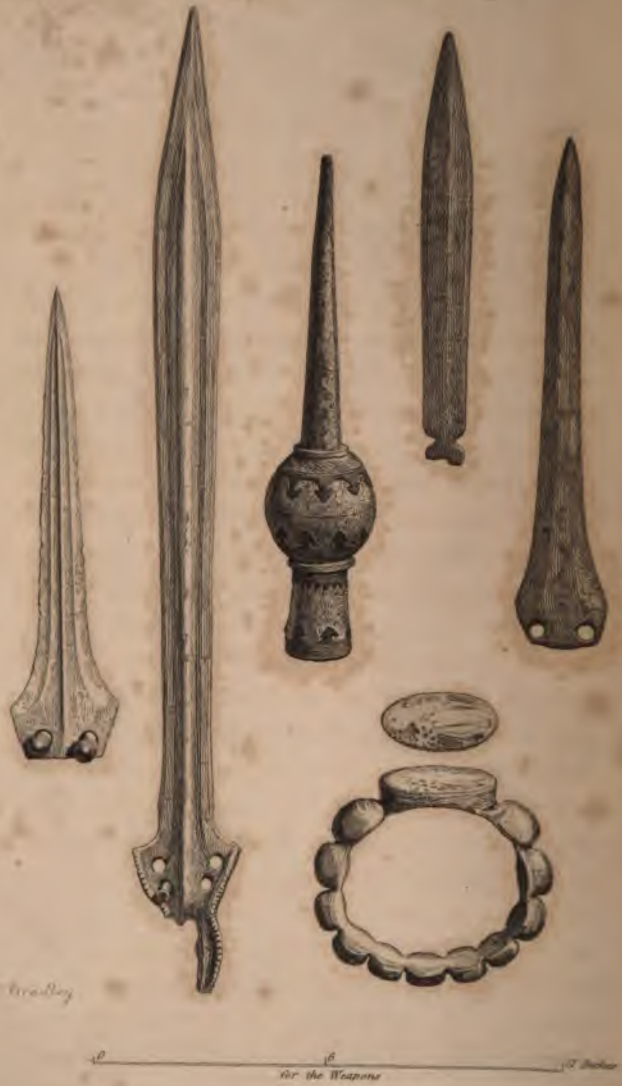

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'Exesa inveniet scabra rubigine pila,
'Grandiaque effossis mirabitur ossa sepulcris.'

ONE of the workmen employed in getting out the earth from the coffer-dams that were sunk for the purpose of laying the foundation for the new bridge over the river Thames, at Kingston, brought me three Roman swords which were found deposited at some depth in the ground on the Middlesex side of the river; since when I have further obtained two spear-heads, one of exquisite workmanship and shape, and both quite perfect;—a Roman sword, beautifully fluted near the edges, and nearly as fresh as when it came out of the hands of the maker;—and what appears to have been the iron top of a Roman banner, on which the eagle perhaps was placed. These weapons, &c., and some other relics, which are not in my possession, were found near the same spot, and are pronounced, by competent judges, to be more perfect specimens than any that are to be seen in the Roman, Neapolitan, or Florentine collections. A Roman thumb-ring—at least what was supposed to be one (for it might fit the digitus annularis of a stout old Roman)—was found at the same time; and this also is a perfect and most beautiful specimen.

The discovery of these articles may remove a doubt which has existed in the minds of antiquaries, whether Cæsar, on quitting his encampment on Wimbledon Common, crossed the river Thames at Weybridge, at the place now generally supposed, and where the remains of a defensive work called the Cowey Stakes may still be seen, or whether, as some have conjectured, he crossed the river at Kingston, at the place where the weapons in question have been found. I will now state my reasons for giving the preference to the latter situation, as the spot where the Romans attempted to force the Thames. In the first place, from the number of Roman warlike implements found in the bed of the river, many of them in a *broken* state, it is clear that a great conflict took place in passing this line of defence; in the next place, this was probably the only known fordable part of the river, and was the nearest approach for the Roman army, in their march from the neighbourhood of Sandwich, and tallying with Cæsar's historical account, who was so remarkable for his accuracy in military admeasurement. And, although there is not any doubt but that the Cowey Stakes formed a defensive work of those times, yet it could never have been chosen as a place of passage for the Roman army, when it was well known as a deep, rapid, and by no means fordable part of the river, except—as I am informed by the surveyor of the Thames Navigation—during the extreme drought of a long summer. I have also ascertained, from the same gentleman, that no weapons of any description have been found near the Cowey Stakes, though some of the stakes themselves are still remaining, *shod* with brass at the ends, for the purpose of driving them into the earth.

In addition to these remarks, I should mention, that, in digging for brick earth in some fields on the *Surrey* side of the river, and within a short distance of the Kingston Ford, a number of skeletons have been found, which occupy a considerable portion of the fields. It is evident they must have been placed there after some tremendous engagement, and that they are not the remains of civil sepulture. In the first place, they were all males; in the next place, where the jaws were at all perfect, the teeth were those of young subjects. There were not any vestiges of monumental remains, neither boundary nor inscription, as might have been expected, to mark a regular cemetery; and there were found some pieces or fragments of broken earthenware, very characteristic of Roman material as well as workmanship, dispersed here and there amongst the several layers of bodies. Several ornaments, such as jet pins and other articles, were also found, which have been pronounced by competent judges to be Roman.

On the *Middlesex* side of the river, and at about half a mile from the ford, a British barrow is in existence, but which I have been unable to procure leave to open; and the remains of an old encampment may be traced near it. It appears probable that the bodies of those British, who were killed in defending the ford, were deposited in this barrow, and that the Romans occupied the encampment soon after the fight.

Horsley, in his Britannia Romana, (and he was shrewd and indefatigable in his researches,) gives the preference to Kingston Ford, as the place of Cæsar's passage. Cæsar himself describes the situation as being about eighty miles from the sea, which Kingston is; and it is the first ford from the sea which is not influenced by the tide. My argument is also strengthened by the fact, that, before and during a great part of the Saxon era, this place was called 'Moreford,' or the Great Ford. No mention is made of any other battle having been fought between the Romans and British in the defence of the passage of a river; and the weapons and other articles, which have been found in the bed of the river at Kingston, are Roman. I have at least the authority of William Hamilton, Esq., for saying so,—a gentleman, whose fondness for the fine arts, and profound knowledge of everything that is rare and beautiful in the works of the ancients, have enabled him to enrich his country with so many splendid specimens of antiquity.

Having shown the above remarks to some gentlemen, by whose learning and shrewdness of criticism I was anxious to have my own opinion either established or confuted, they favoured me with the following communications, which I give nearly as I received them, together with an engraving of the weapons, &c.

In submitting this little discussion to the public, I cannot help expressing a hope that it will be read with interest, and that it will produce some further arguments, either for or against the probability of Cæsar's passage at Kingston. My own remarks are given without a pretension to learning or antiquarian knowledge, and contain a mere statement of facts, with the few remarks which have suggested themselves to me.

I should add to my notice of the weapons, that they appear to be made of brass, with the exception of the fluted spear-head, which is supposed to have a mixture of silver in it. It had a sort of white bloom upon it, and was very different in appearance to the sword which was found close to it, and which looked like bronze from the long-continued action of the water upon it. The ring is of brass, the top of the banner is iron, and the ornaments round it brass. It is difficult to give an accurate delineation of this last in an engraving.

LETTER I.

' Dear Sir,

' I have a few remarks to make on the letter ' you sent me, respecting Cæsar's passage of the ' Thames, in reference to your Roman weapons.

' The boundary of Cassivelaunus' kingdom is thus ' described:—" Cujus fines maritimis civitatibus ' flumen dividit quod appellatur Thamesis, a mari ' circiter millia passuum LXXX;" and then, " Cæsar ' cognito consilio eorum *ad flumen Thamesin in fines* ' *Cassivelauni* exercitum duxit, quod flumen uno ' omnino loco pedibus, atque hoc ægre, transiri ' potest."

' Cæsar led his army, therefore, to the place where ' the Thames was the boundary of Cassivelaunus' ' kingdom (" ad Thamesin in fines Casio exere, ' &c."). Of this kingdom of Cassivelaunus I am ' not sufficiently informed; but it appears generally ' to have been westward of the Trinobantes, and ' eastward of the Dobani, and must have come down ' southward to the Thames, opposite the western ' shore of Surrey. If this be something of the gene' rally-established position of the kingdom, it is just ' to conclude that to this point Cæsar led his army. ' The battle and defeat of Cassivelaunus at his 'capital afterwards was at St. Alban's, which is in a 'longitudinal line with Kingston; and this neighbourhood would answer to the LXXX miles. The 'accuracy of Cæsar's writing and statesmanship will 'not allow us to suppose he would commit himself 'by calling the Trinobantes (whose independence he 'came to establish) Cassivelaunus' kingdom, because 'he had at that time usurped it, which, if he had 'crossed at London (as some have thought he did), 'must be supposed. It appears to me, therefore, 'that the "fines Cassivelauni ad Thamesin, &c." 'was about eighty miles from the sea; and that 'there was only (because Cæsar says so, who must 'have known all about it) at that time one fordable 'place. The present state of the river is no argument against his express assertion; and it seems 'plain that the Britons, knowing that there was only 'one ford, and that he must pass it, defended it well, 'and waited for him accordingly.

'You have at Kingston, then, about *eighty miles*— 'you have a *ford*—you have it *in a longitudinal* '*line with the capital of Cassivelaunus' kingdom*— 'and you have Roman spears and swords (better 'documents than the wooden stakes) to evidence it.

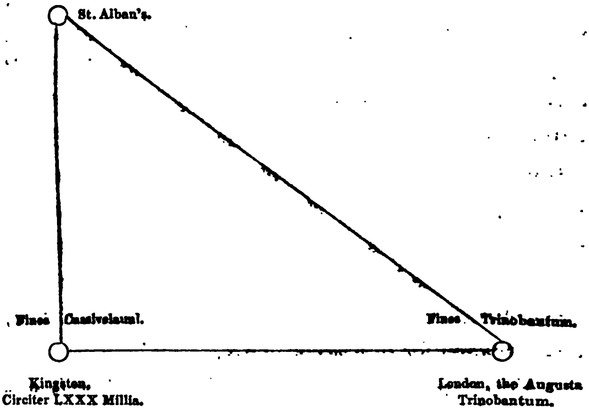
'I am, &c.

'C. T.'

LETTER II.

'Dear Sir,

'I have only a few words to say in addition 'to the remarks made in my former letter.



'Cæsar uses the same words in describing the boun'dary of Cassivelaunus, as in describing the point to 'which he led his army—namely, Fines Cassive'launi—ad flumen Thamesin; and he says these '"Fines" were circiter LXXX mill. from the sea. 'He says also there was only one ford. This is *all* '*he* says, and all I believe. When I mentioned 'Kingston as the specific place, I did so because the

'Roman weapons found in the river, the British 'barrow a short distance from it, and the "circiter '80 miles," being the only safe point to interpret 'and be sure of, the "Fines Cassivelauni." The 'reasonings, from the present state of the river, I do 'not think could be considered of much value; but 'it may be remarked that all places not above tide 'could only be supposed fordable at low water, which, 'in case of a defeat and a retreat!—a rashness we 'cannot suppose Cæsar to have committed.

'If you should or could think Cæsar knew little 'about fords and other British matters, do not forget 'that the King of the Trinobantes had been with 'him in Gaul.

'I am, &c.

'C. T.'

Another friend has favoured me with the following remarks:—

'Nothing is more easy than to criticise and contradict opinions which happen to be formed on 'presumptive evidence only. I mention this with 'reference to the objections which may be raised as 'to the probability of Cæsar having crossed the 'Thames at Kingston. It is certainly nowhere 'stated by Cæsar, that, upon his landing on the 'coast of Kent, he marched directly to the Thames 'at Kingston; yet, as Cæsar tells us, that during 'his progress from the coast the natives held him 'several times in check, and frequently, by detached 'parties and feigning flight, endeavoured to decoy 'the Roman legions to pursuit, in order to distract 'their main body and divide their force; and that 'when he found, after several and repeated interrup'tions of this nature, that the Britons no longer in'tended to attack him with their main force, he imme'diately led his army to the limits of the territories 'of Cassivelaunus, which were bounded by the river 'Thames at a distance of eighty miles from the sea, '—it is quite unnecessary, and would be futile to 'argue that, with these repeated interruptions to his 'invading progress, he would have had it in his power 'to march as the crow would fly, and proceed in one 'undeviating straight line from the coast to the 'immediate confines of the enemy's stronghold. 'Therefore, as regards any criticism with respect 'to the non-allusion of Cæsar, in his eighty miles 'admeasurement, to his own line of march, no one 'for a moment who has read his Commentaries 'can object; but I take my ground in forming, or 'rather continuing my conclusions, that the first act 'of Cæsar upon his arrival on our coast, however 'ignorant he might originally have been of the bear'ings and localities of our rivers and strong passes, 'would be to ascertain the nearest, as well as the 'safest route (subject of course to intervening devi'ations), by which he could penetrate, and ulti-

'mately occupy, the territorial possessions of his 'invaded foe.

'Now it appears to me very easy to say that *this* '*part* of the Thames, or *that part* of the Thames, 'would have afforded the best and most likely place 'by which the Roman general could have gained his 'point; and thus far the advocates for the proba-'bility of the passage having been effected either at '*London,* at *Kingston,* or at the *Cowey Stakes,* 'are upon a par; but, when we come to collect and 'distribute fairly the corroborative circumstances 'attending each of these probabilities, I think it must 'be declared by all impartial judges that the balance 'is greatly in favour of the Kingston Ford.

'The impression on my mind is (though perhaps 'I may be mistaken on this point) that London, 'or rather the site of the present London, at the 'period of the invasion, was even then a town of 'some note and character; and had it been Cæsar's 'intention, as well as policy, to penetrate this place 'of concentration, which would have formed a fea-'ture in his invading progress, is it likely that he 'would have been silent on so important a point, 'and have withheld from posterity the details, the 'results, and the urgent reasons for forcing the 'passage of the river at this place, so *wide,* so *rapid,* 'and so *greatly,* as well as *constantly* interrupted by 'the never-ceasing tide? Nor have we, independent 'of all these natural obstructions, any authentic or 'traditionary accounts of the existence of regular 'and established fords in this portion of the Thames. 'And again, it would appear, that, as the mode of 'attack, as well as defence, which the British forces 'mainly depended on, was a desultory sort of bush-'fighting, chiefly relying on the woods for protection 'and annoyance; and as it is well known that the 'country lying between Kingston and the coast 'formerly abounded in such woods, and in places 'so favourable for their mode of warfare, we have 'good ground for believing that this would be the 'route by which the gradually-retreating and de-'feated Britons would attract the victorious Romans 'to the Trinobantine territory, even should the 'crafty and skilful Cæsar have neglected to gain 'this information, so necessary and important to 'bring him by the readiest road towards the enemy's 'camp.

'As I have said before, we have no reasonable nor 'strongly-marked account of any perfect or regular 'passage across the river from its estuary until we 'reach Kingston. It is, however, very probable, 'that, in particular dry seasons, here and there, by 'accident, or from the washing up of sand-banks in 'times of flood, the possibility of a temporary 'passage might be effected; but could it have en-'tered the mind of a general so wary as Cæsar to 'build upon the chance of so dangerous an expe-'dient? Hearne, in his edition of Leland's Col-

'lectanea de Rebus Britannicis, London, 1774, 8vo. 'vol. i., tells us "that Bagford asserted that the 'Roman invader, with his legions, came straight 'from the coast, and passed along the rich marshy 'ground, now the site of Kent-street, and entering 'the Thames just as the tide was turning, his army 'made a wide angle, and was driven ashore by the 'current close to Dowgate Dock."

'But, though we have this recorded opinion of 'good Mr. Hearne, and the still earlier statement 'of Dion Cassius, in his historical record of the 'invasion of Britain by the Emperor Claudius, who 'asserts the existence of two or three fordable points 'in the neighbourhood of London, yet the result of 'these statements is decidedly against the probability that Cæsar would have risked his army to 'so dangerous and intricate an uncertainty. For 'Dion Cassius, in illustration of his facts, winds up 'by saying, "that these temporary fordable passages 'were of a nature so dangerous, as well as intricate, 'that they were only useful in a slight degree to 'the natives, who, by dint of practice, became acquainted with the depths and shallows; but, when 'the Emperor Claudius, in his subsequent invasion 'of the country, endeavoured to pursue the natives 'by this route, his army was brought into the 'greatest danger by the attempt."

'Indeed, within these few years, it was observed, 'during a period of great drought and very low tide, 'that a passage across the Thames at London might 'have been effected; but no one will say that this 'accidental occurrence could be construed into the 'existence of a regular and acknowledged ford. I 'have neither time, nor access to proper books of 'reference, to seek further support to my argument; 'and as it is not very probable that our early acquaintance, Cæsar, will turn out any second edition 'of his interesting Commentaries, either with annotations or amendments, we must still go on conjecturing in the dark, and even at last leave the 'subject nearly in the same spot where we found it. 'Taking, then, conjecture for our groundwork, I am 'still strongly inclined to believe the preponderance 'to be in favour of the ford at Kingston. In support 'of this view, it forms a point of approach from the 'coast as near as any other, if not nearer; and, as I 'said before, is the most likely road of retreat that 'the invaded natives would gradually prefer, from 'the intervening means it afforded by protection 'from its woods. It is likewise the first portion of 'the river not subjected to the dangerous and incessant interruption of the tides. And it is well 'authenticated that there formerly was at this place 'a well established and ample ford; and if stronger 'proof were necessary of its existence and celebrity, 'the very name of this ancient town bears testimony to the truth, being in the days of our forefathers designated *Moreford*, or the *Great Ford*.

'highly characteristic of the circumstances of its 'situation.

'Nor is it to be traced by traditionary or recorded 'observation, that any other neighbouring part of 'the river is or ever was known as a regular and 'established ford. Having, therefore, this public 'and well known character, and being equidistant, 'if not nearer from the coast, with other places 'offering less advantages for the transit of an army, 'Cæsar, of his own accord, would naturally make 'for such a point, even if not encouraged and led to 'do so by the retiring foe.

'I must not pass over this favourite view, without 'calling in aid the circumstance of finding so many 'and such fine specimens of Roman arms on the 'spot in question. It has been asked whether 'Roman arms might not be found in other places? 'My answer is, Have they been so found? and have 'they not been found at Kingston? and, when so 'found, have they not been pronounced, by competent judges, to be as fine specimens of Roman 'weapons as are to be met with in any of the galleries abroad?

'We may be told that a new light may break in 'upon us, in the demolition of the old London 'bridge, by bringing up specimens indicative of 'the existence of an ancient ford at this spot! I 'can only say that the coffer-dams of the new London bridge, approaching so close to the old site, 'have completely failed in bringing forth any remains tending to strengthen this conjecture; but, on 'the other hand, every excavation in the bed of the 'river at Kingston, for the purpose of establishing 'the coffer-dams, discovered Roman arms, and 'weapons only Roman. Had they been the mere 'SPOILS or TROPHIES of a conflict, they would not 'have been thrown into the bed of the river, as useless and disregarded, but would have been carried 'off in triumph. The rational presumption is, that, 'in the attempt to force the river, the passage was 'disputed, and though we have Cæsar's authority for 'saying it was effected, yet he likewise states, that 'defences were set up on the opposite bank; and it 'should be well observed, that by far the greatest 'portion of these RELIQUIÆ were discovered where 'the fight would have been the hottest, namely, on 'the Middlesex side of the river. I will not, on the 'present occasion, enter into any discussion as to the 'improbability of Cowey Stakes being the favoured 'spot; inasmuch as it has not the slightest sanction 'from the evidence of Cæsar's declaration, namely, 'that he passed the river at the only fordable 'point; for it so happens that every part of the 'Thames, in this neighbourhood, is particularly deep; 'and, from repeated examinations, it is evident that 'this depth arises from the original conformation of 'the river, and that it is not owing to any subsequent 'embankment, or deepening of the channel; indeed, 'the very stakes which are occasionally taken up 'bear ample testimony to the original depth: I say 'original; for there is little or no doubt but that they 'were the defensive work of some very early period, 'not, intended, however, to oppose the passage of an 'army, choosing the "*Unum omnino locum quo 'flumen transiri potest.*"'

I am bound in candour not to dismiss this subject, without stating some objections which have been urged to the view of it, which I have been endeavouring to support.

1. It has been said that the eighty miles of Cæsar have no such reference to his own march, as the commentators have usually understood; but described *geographically* the southern limit of Cassivelaunus' kingdom. The words are, 'Summa 'imperii bellique administrandi communi consilio 'permissa est Cassivelauno; *cujus fines a maritimis 'civitatibus flumen dividit, quod appellatur Thamesis, à mari circiter Millia passuum LXXX*:' i. e. 'whose frontier is divided by the river Thames, 'from the maritime states, at about eighty miles distance from the sea.'

This 'maritime region' is afterwards explained to be the side of England which faces Gaul; and hence it is contended that the admeasurement of Cæsar only marks the distance at which the Thames runs parallel to the sea, between this maritime district, and the territories of Cassivelaunus.

2. It is said that Kingston is excluded by Cæsar's words:—'quod flumen uno omnino loco pedibus '..... transiri potest:'—since, in coming from the east, he must already have passed by more than one ford, namely, at Teddington, Fulham, or, perhaps, one opposite Somerset House.

3. The ford last mentioned is proposed as having a better claim to the honour of Cæsar's passage, than *any* of those which have been fixed upon for it, being the first on his way from the east. Having no design of going farther to the westward than he could help, he neither knew, nor would care to inquire for, fords up the country, and out of his line of operations. He had been left by the Britons, whom he had routed and was pursuing, somewhere in the central woods of Kent. He then turned 'ad Thamesin,' and would cross the river at the first fordable place he came to.

4. A question is raised, whether the weapons, being of brass, can have belonged to Cæsar's soldiers, who, it is thought, had probably weapons of steel, or at least iron. So one of our poets describes the Britons as daring

'—— their rudely painted limbs oppose
'To chalybean steel and Roman foes.'

Having now given some of the principal arguments which have occurred to others and myself, as to the probability of Cæsar's having passed the Thames at Kingston, I will dismiss the subject with a hope that it will be taken up by abler hands than mine.

MAXIMS AND HINTS

FOR

AN ANGLER.

A FRIEND of mine, with whom I have enjoyed many an agreeable day's fishing, and whose excellence of heart and mind, as well as his attainments in the science of the angle, would have procured him the friendship of Izaak Walton, had he lived in his time (which luckily for myself and his other friends, he did not), has allowed me to introduce the following shrewd and pithy remarks on Fly-fishing, written by him in the Album of a celebrated Fishing Club.

E. J.

'that a passage across the Thames at London might 'have been effected; but no one will say that this 'accidental occurrence could be construed into the 'existence of a regular and acknowledged ford. I 'have neither time, nor access to proper books of 'reference, to seek further support to my argument; 'and as it is not very probable that our early ac'quaintance, Cæsar, will turn out any second edition 'of his interesting Commentaries, either with anno'tations or amendments, we must still go on con'jecturing in the dark, and even at last leave the 'subject nearly in the same spot where we found it. 'Taking, then, conjecture for our groundwork, I am 'still strongly inclined to believe the preponderance 'to be in favour of the ford at Kingston. In support 'of this view, it forms a point of approach from the 'coast as near as any other, if not nearer; and, as I 'said before, is the most likely road of retreat that 'the invaded natives would gradually prefer, from 'the intervening means it afforded by protection 'from its woods. It is likewise the first portion of 'the river not subjected to the dangerous and in'cessant interruption of the tides. And it is well 'authenticated that there formerly was at this place 'a well established and ample ford; and if stronger 'proof were necessary of its existence and celebrity, 'the very name of this ancient town bears testi'mony to the truth, being in the days of our fore'fathers designated *Moreford*, or the *Great Ford*.

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1. When your fly first touches the water at the end of a straight line.

2. When you are drawing out your fly for a new throw.

In all other cases it is necessary that, in order to hook him when he has taken the fly, you should do something with your wrist which it is not easy to describe.

XVI.

If your line should fall loose and wavy into the water, it will either frighten away the fish, or he will take the fly into his mouth without fastening himself; and when he finds that it does not answer his purpose, he will spit it out again before it has answered yours.

XVII.

Although the question of fishing up or down the stream is usually settled by the direction of the wind, you may sometimes have the option; and it is, therefore, as well to say a word or two on both sides.

1. If, when you are fishing down-stream, you take a step or two with each successive throw, your fly is always travelling over new water, which cannot have been disturbed by the passing of your line.

2. When you are fishing up-stream, you may lose the advantage of raising so many fish; but, on the other hand, you will have a better chance of hooking those which rise at your fly, because the darting for-

MAXIMS AND HINTS

FOR

AN ANGLER.

gently raises his mouth to the top of the water, and quietly sucks in the fly attempting to pass over him. A rising of this sort is not easily seen, but it is worth looking for; because, although a fish feeding in this manner will rarely go many inches on either side for a fly, he will as rarely refuse to take one which comes (without any gut in the water) directly to him.

XXV.

If your fly (gut unfortunately included) should swim over a fish without his taking it, look out well for a darting line of undulation, which betokens his immediate departure; and remember that it is of no use to continue fishing for him after he is gone.

XXVI.

The stations chosen by fish for feeding are those which are likely to afford them good sport in catching flies, viz.—1. The mouths of ditches running into the river;—2. The confluence of two branches of a stream, which has been divided by a patch of weeds;—3. That part of a stream which has been narrowed by two such patches;—4. Fish are also to be found under the bank opposite to the wind, where they are waiting for the flies which are blown against that bank, and fall into the river.

XXVII.

If, during your walks by the river-side, you have marked any good fish, it is fair to presume that other persons have marked them also. Suppose the case of two well-known fish, one of them (which I will call A) lying above a certain bridge, the other (which I will call B) lying below the bridge. Suppose further that you have just caught B, and that some curious and cunning friend should say to you in a careless way, 'Where did you take that fine fish?' a finished fisherman would advise you to tell your inquiring friend that you had taken your fish just *above* the bridge, describing, as the scene of action, the spot which, in truth, you know to be still occupied by the other fish A. Your friend would then fish no more for A, supposing that to be the fish which you have caught; and whilst he innocently resumes his operations below the bridge, where he falsely imagines B still to be, A is left quietly for you, if you can catch him.

XXVIII.

When you see a large fish rising so greedily in the middle of a sharp stream, that you feel almost sure of his instantly taking your May-fly, I would advise you to make an accurate survey of all obstructions in the immediate neighbourhood of your feet—of any ditch which may be close behind you—or of any narrow plank, amidst high rushes, which you may shortly have to walk over in a hurry. If you should hook the fish, a knowledge of these interesting localities will be very useful to you.

XXIX.

When your water-proof boots are wet through, make a hole or two near the bottom of them, in order that the water, which runs in whilst you are walking in the river, may run freely out again whilst you are walking on the bank. You will thus avoid an accompaniment of pumping-music, which is not agreeable.

XXX.

Never mind what they of the old school say about 'playing him till he is tired.' Much valuable time and many a good fish may be lost by this antiquated proceeding. Put him into your basket *as soon as you can.* Everything depends on the manner in which you commence your acquaintance with him. If you can at first prevail upon him to walk a little way down the stream with you, you will have no difficulty afterwards in persuading him to let you have the pleasure of seeing him at dinner.

XXXI.

Do not be afraid of filling your pockets too full when you go out; you are more likely to leave something behind you than to take too much. A man who seldom catches a fish at any other time, usually gets hold of one (and loses him of course) whilst his attendant is gone back for something which had been forgotten.

XXXII.

If your attendant is a handy fellow at landing a fish, let him do it in his own way; if he is not, try to find a better man, or go home. Although so much depends upon his skill, you will rarely derive much comfort from asking him for his opinion. If you have had bad sport, and say to him, 'Which way shall we go now?' he will most probably say, 'Where you please, sir.' If you ask him what he thinks of the weather, he is very likely to say that last week (*when you were in London*) it was 'famous weather for fishing;' or he will perhaps say, that he expects that next week (*when you are to be at home again*) it will be very good. I never knew one of these men who was satisfied with the present hour.

XXXIII.

Do not leave off fishing early in the evening because your friends are tired. After a bright day, the largest fish are to be caught by whipping between sunset and dark. Even, however, in these precious moments, you will not have good sport if you continue throwing after you have whipped your fly off. Pay attention to this; and if you have any doubt after dusk, you may easily ascertain the point, by drawing the end of the line quickly through your hand,—particularly if you do not wear gloves.

XXXIV.

No attempt is here made to give directions as to the best seasons for cutting the woods which are fittest for the making of rods, or as to the mode of preparing them; because the worst rod which is kept for sale at the present day is probably as good as the best of the first few dozens which any amateur is likely to make for himself.

XXXV.

Lastly—When you have got hold of a good fish, which is not very tractable, if you are married, gentle reader think of your wife, who, like the fish, is united to you by very tender ties, which can only end with her death, or her going into weeds. If you are single, the loss of the fish, when you thought the prize your own, may remind you of some more serious disappointment.

R. P.

Rod Cottage, River-side, 31*st May*, 1829.

POSTSCRIPT.

I FORGOT to say, that, if a friend should invite you to his house, saying that he will give you 'an excellent day's fishing,' you ought not to doubt his kind intention, but you certainly ought not to feel very sure that you will have good sport. Provide yourself for such a visit with everything which you may want, as if you were going into an uninhabited country. Above all things, take a landing net with you. Your friend's (if he has one) is probably torn and without a handle, being a sort of reticulated shovel for taking fish out of the well of a punt. Take warning from the following story:—

Mr. Jones and Mr. Thompson went last week to the house of Mr. Jenkins, for a few days' fishing. They were received with the utmost kindness and hospitality by Mr. and Mrs. Jenkins, and on the following morning after breakfast, the gardener (who was on that day called the fisherman) was desired to attend them to the river. Thompson, who had a landing-net of his own, begged to have a boy to carry it. Jack was immediately sent for, and he appeared in *top* boots, with a livery hat and waistcoat.

Arrived at the water-side, Thompson gave his gnat basket to the boy, and told him to go on the other side of the river, and look on the grass for a few May-flies. Jack said that he did not exactly know what May-flies were, and that the river could not be crossed without going over a bridge a mile off. Thompson is a patient man, so he began to fish with his landing net for a few May-flies, and after he had necessarily frightened away many fish, he succeeded in catching six or seven May-flies.

Working one of them with the blowing line much to his own satisfaction, and thinking to extract a compliment from his attendant, he said, 'They do not often fish here in this way—do they?' 'No,' said the boy, 'they drags wi' a net; they did zo the 'day afore yesterday.'

Our angler, after much patient fishing, hooked a fine trout; and having brought him carefully to the bank, he said, 'Now, my lad, don't be in a hurry, but get him out as soon as you can.' Jack ran to the water's edge, threw down the net, and seizing the line with both hands, of course broke it immediately.

Nothing daunted, Thompson now mended his tackle and went on fishing; and when he thought, 'good easy man,' that the very moment for hooking another trout was arrived, there was a great splash just above his fly;—and the boy exclaiming, 'Damn 'un, I miss'd 'un,' instantly threw a second brick-bat at a rat which was crossing the river.

Mine host, in order to accommodate his friends, dined early; and when they went after dinner to enjoy the evening fishing, they found that the miller had turned off the water, and that the river was nearly dry,—so they went back to tea.

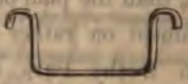
R. P.

TREE PLANTING.

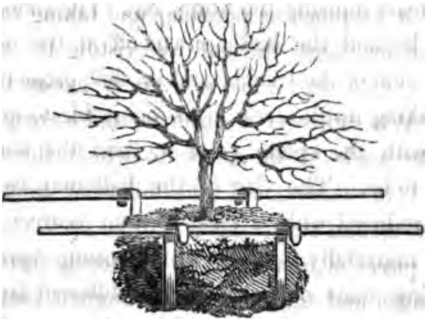
So much has been lately said respecting Sir Henry Stewart's method of transplanting large trees, that I am induced to mention a method I have adopted in some of his Majesty's parks, which has been attended with great success, and which, I believe, will be found to be infinitely cheaper, and more generally to be depended on, than the plan of Sir H. Stewart. I tried the experiment on rather a large scale this spring (1831), in Bushy Park, and under every disadvantage, as I was not able to begin the work till the second week in March, and there was rather a long continuance of cold dry weather after the plants had been removed. Of some hundreds of trees which were taken up and replanted, not one had died, though many of them were of a large size, and some of them laurels from ten to twelve feet in height, showing their blossom at the time they were transplanted, which was not at all checked by the operation.

The plan I adopted is as follows: In the first place, the earth must be excavated at some distance from the tree, leaving all the principal fibres, and the earth adhering to them, in a compact ball, undermining it as much as possible, and taking care not to shake or injure the ball by twisting the stem of the tree, or using it as a lever to loosen the tap roots. When this has been done, and a corresponding hole made at the place to which the tree is intended to be removed, the following method of taking it up and conveying it is to be used.

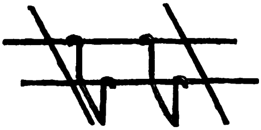
Two pieces of iron must be previously formed, of the breadth and thickness of a common cart-wheel tire, three or four inches wide, and rather more than half an inch in thickness, and about six feet long, bent in this form,



which will reduce it to three feet across. This size will do for trees requiring from two to four men to lift them; but a size larger and stronger in proportion will be wanted for trees, which will require from eight to ten or more men to carry them. Put these irons under the ball of earth, as near the centre as possible, leaving a space between them of about two feet, and for larger trees a little more. Run two strong poles about eight or ten feet long, and three or four inches in diameter, and smaller at each end, and apply them, as shown in the sketch, to each side, passing them through the bends of the irons, so as to form a complete hand-barrow. The tree may then



be readily lifted. Cross levers may be used for larger trees which require more men, thus:—



so that as many men can conveniently apply their strength to it as are wanted, without being in each other's way. The whole is fixed and unfixed without any loss of time, and requires no tying, nor is there any danger of its slipping off. One of the chief advantages of this method is, that the tree is supported ou the ball of earth, instead of the earth being supported by the fibres, as is usual in most cases. Even in moving large trees with trucks, sledges, &c., most of the mischief is done in loading and unloading, and in adjusting the tree to a proper position, which can all be done by the above method, without in the least injuring the fibres, &c. The roots which extend beyond the ball are cut off at the outer or further side of the trench, and are left projecting.

In taking up the tree, it is advisable to go much wider with the spade *from* it, than the ball is intended to be. The size of the ball may be afterwards reduced with a pick, so that scarcely a root will be materially injured. In planting, spread the projecting roots out carefully in different layers, as near as possible to their original position, as the hole is gradually filled up with mould.

The best way of forming the ball is to prepare it the year before the tree is to be taken up. This is to be done by digging round it, and cutting most of the principal roots. This has been long practised with success; but where this precaution has not been taken, the above method will be found preferable to cutting the roots close to the side of the ball of earth.

In removing very large trees, such of the tap and other large roots which cannot conveniently be got at may be separated by means of a long chisel, which can be readily applied under the ball of earth. In moderate-sized trees, however, this is not required.

Having mentioned this plan of planting, it is only fair to add, that the trees I have removed are not so large as those described by Sir H. Stewart. Had it, however, been necessary for me to have planted larger trees, I have no doubt but that I should have succeeded equally well; as, by means of the cross levers, the strength of a proportionate number of men may be readily applied.

Having stated that I consider my plan preferable to that of Sir H. Stewart, I will now give my reasons for saying so. In the first place, it is cheaper.

I have ascertained this by comparing the expense which it cost a gentleman to plant some moderate-sized trees on Sir H. Stewart's plan, with what it cost to plant an equal number on my own, and I found that I could do it much cheaper.

In the second place, I consider my plan more successful in preserving the lives of the trees, and more generally applicable to every description of tree and shrub—large laurels, for instance, the fibrous roots of which cannot be exposed without destroying the tree. Elms, which are very tenacious of life, will succeed well by either plan; and with common care may be transplanted of a large size. Oaks, beech, Spanish chestnuts, and birch, do not soon recover from the exposure of their roots. Hollies, also, of some years' growth, suffer from it. By taking these trees up in the manner I have described, they do not appear to feel the removal.

Lastly, I do not find that any of the trees which I have thus planted require support, as the large ball of earth steadies them sufficiently.

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